

Space Details

Key:	ESPAPP
Name:	900612 ESP -- SURF Center
Description:	This space serves as a repository of ESP development ideas and decisions.
Creator (Creation Date):	kgomes (Apr 03, 2007)
Last Modifier (Mod. Date):	jbirch (Jun 24, 2008)

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- Task Wish List between D-ESP deployments 27OCT--25NOV, 2009
- Very cold Syringe Part Numbers
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Welcome to the ESP - SURF Center

Administrative Items

[ESP Logos](#)

Meeting notes (no longer maintained--Sep 2012)

1. [2007 Meeting Notes](#)
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Engineering	Deployments
Generation 3 1. Cartridge testing 2. Functional Requirements for G3 ESP 3. Detection Technologies 4. Development Leads 5. G3 - LRAUV Integration 6. Lab Automation Conference Notes 7. G3 Process Diagrams 8. Turbine Technical Options 9. G3 IO List 10. AccelBiotech Slides	1. 2008 Deployments(MB) 2. 2009 Deployments(MB, MARS, SC Wharf) 3. 2010 Deployments (MB, SoCAL, Methane Mound, Drifter, MARS, SC Pier) 4. 2011 Deployments(MB, GoM, Axial, Drifter-HI, SC Pier) 5. 2012 Deployments (MB, New Zealand, SoCAL, Friday Harbor, GoM, Drifter) 6. 2013 Deployments (MB, SoCAL, MARS, Puget Sound) 7. 2014 Deployments (MB, San Diego, Catalina, SoCAL, 3G) 8. 2015 Deployments (MB, SCRIPPS, 3G) 9. 2016 Deployments (3G in MB twice, SCRIPPS, Moran) 10. 2017 Deployments (3G, SCRIPPS...) 11. 2018 Deployments (3G, MB) 12. 2019 Deployments
System Integration 1. System tubing diagram (updated 03 Nov 2009) 2. Engineering Timeline 2008 3. Cheat Sheet 4. Container Storage Locker Information (10-1-2008)	
Hardware 1. EM cables, shockle, and line lengths 2. Deep ESP/Sable Tracker 3. Melo Iridium Tracker 4. Micro-Fluidics Block 5. LLNL PCR heater module	Science 1. Sandwich Hybridization Assay 2. MFB-PCR distribution list as of 4Nov2010

6. [Shallow Housing Plans](#)
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8. [DWSM--4k Deep Water Sampling Module](#)
9. [Puck Numbering System](#)
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11. [Frit Identification system](#)
12. [ISUS issues](#) (updated 31 Aug 2010)
13. [ESP Drifter](#)

Software

1. [Instrument Software Revision Level](#)
2. [JIRA Bug Tracker](#)
3. [GUI Component Development Pages](#)
4. [ESP Image Analysis Application](#)
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6. [ESP Servo Simulation](#)
7. [Power Commands \(9-30-08\)](#)
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Comments

15m EM cable Float Locations
Float number Distance from Bale Flange(meters)

1	0.9
2	1.25
3	1.62
4	2.03
5	2.66
6	3.23
7	3.90
8	4.57
9	5.36
10	6.03
11	6.79
12	7.49
13	8.20
14	9.04

One of the cable measures from flange to flange 13.92m

Posted by [sjensen](#) at Mar 18, 2011.

2007 Meeting Notes

This page last changed on Aug 26, 2008 by [kgomes](#).

Meeting minutes stored in the projectlibrary:

1. [Meeting Notes from June 7, 2007](#)

Meeting minutes stored within Confluence:

1. [08nov2007](#)
2. [15Nov2007](#)
3. [29Nov2007](#)
4. [06Dec2007](#)
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Engineering weekly meeting (Dec 6, 2007)

Birch Absent. Notes by Jensen...

1. Software situation

2 bugs

1.
 - a. Continuation
 - b. Dead Parents

Enough runs yet?# NEO completes 5 runs continuously, should we run 5 more?
Concern is we may run low on reagents. No, hand over to science now that Brent has handle on where two bugs are.

We will stay with Ruby v. 1.6 and leave Neo as is.

NEO

Cheri will change light-seal next week
Software will remain unchanged
intake is running slow--must check
science to find problem with arrays

Manipulator Redesign

Redesigned fingers are working well
Forearm
 motor pulley good
 front needs to be finished
Cheri waiting on machining of several arm parts and arrival of bearings. Should be in tomorrow.

MFB

Good results from first SPE run; good DNA yield

Concerns with SPE heater

- * fluidic bubble heating
- * loading and eluting at 2 different temperatures
- * will work toward thermal profiling
- * Add relay heater with solenoid

LLNL--they rec'd the heater Thursday, Nov 29, 2007. Tony's email of Monday, Dec 3, 2007:

Jim, We got the block last Thursday. So far we have looked it over to see if anything was disconnected or obviously wrong with it. It looked fine. We have tested the LED's and DIODE's. They seem to be responding as expected, giving increasing response to increasing integration times and increases with the LED on vs off. At this point, I'm going to go ahead and tune it up and try a PCR reaction in it with the same reagents that I sent to you. Should be able to get to you with some results by the end of the day Wednesday. Tony

Discussion ensued about a Waste container. Engineering will look into a hard volume waste bottle w/ filter and possibly hydrophilic gel similar to Cepheid or that used in scrubbers (chris P).

All parts for 2nd MFB have been ordered. Will arrive next year (Jan. 2008)

Possible concern: Burkert website says solenoid valves may be discontinued. Addie will check on.VICI valves order more for 2 spares

Puck Heater

Scott has developed a good model for temperature control via a modified puck sensor finger
We need to run a full mock mission (1 month) with acrylic can within our environmental chamber.

Science Stuff

Chris almost finished with NOPP proposal. Scott & Brent to look over SOW. Due Friday.

FUTURE

must work out deployment schedule for network deployment
which instruments will be going and with what configuration?
fitting in testing for these instruments and rework time.

This page last changed on Nov 14, 2007 by [jbirch](#).

ESP Engineering weekly mtg (11-08-2007)

Present: Brent Roman, Addie Harris, Scott Jensen, Cheri Everlove, Jim Birch

Tech Transfer: Build of 2 new instruments moving along smoothly. New motor brackets being sent to El Camino for machining. That charge (~\$3500) must be subdivided b/w various accounts. Wait to talk to Scholin about this. By Thanksgiving, both machines should be wired and plumbed.

Much discussion about puck sticking to O-ring, and possible fixes/re-designs. Scott looking into.

Software: Ported our code from v1.6.8 up to 1.8.6 and (unfortunately) found exactly the same errors at the same spot. Cannot be made to fail on the simulator, but fails on the actual instrument. Brent attacking this by tracing log comments. Brent attended Ruby Conference in Charlotte, NC and is interested in J-Ruby for our shore station. Will look into.

MFB: still not working but Chris and Addie have run a large number of experiments to try and isolate where our reagent mix is being 'killed'. Conclusion so far is that something within the fluidics block is inhibiting the reaction, since building slugs from the block show diminishing PCR activity the longer we wait to run on the 7700. Trying to build slugs only going through ARV, and other permutations to see where the contamination is entering.

Vacations discussed. Brent will be away for most of Dec. All others have short holiday vacations planned.

Discussion about starting to keep notes on Confluences, this record being the first. Question came up about how easy it would be to search Confluence records.

ESP Engineering weekly mtg (11-15-2007)

Present: Jensen, Scholin, Everlove, Birch, Harris

Tech Transfer

- Still on track to have 2 instruments wired & plumbed by Thanksgiving?
2 units almost completely wired (boards/valves/motors). End of day both powered. Plumbing parts in yesterday and will continue this afternoon. Do 2 units first then retrofit Neo.
- Hand/puck sticking issue? (still working on) New hand design?(getting close, tackled pivot-point and the cam, but still figuring how to support forearm pulley so belt can be fully loaded)
- Science getting to use yet?
Using GG. Don't need Neo
- Time for delivery of new motors/brackets?
Still waiting on brackets (Mike supposed ot have sent PO to El Camino yesterday) and motors (due end Nov).
- Other issues

If some grants come in, we will have many instruments needed around the country. Chris is pushing for building all three (don't leave one as parts). In the near future we will need another production run and should keep in mind parts for the future.

Software

- Progress in Tracing of log comments?
 - Bob Herlien progress on MFB drivers?
 - Rich Schramm progress on GUI?
 - JIRA implementation
- Discussion of these items tabled since Brent is gone.

MFB

- Results from Tues/Weds and subsequent plan going forward
- Solid-Phase-Extraction status
- CAV (AIV) valve arrival?
- Overall parts inventory; do we have everything we need?

Building slug on bench then pulling through the ARV and running in the MFB heater and collecting it after and looking at peak fluorescence and run on gel. WE HAVE AMPLIFICATION. Solutions seems to be due to better cleanliness and care in handling reagents. Optics within the LLNL heater block do not appear to be working properly. Today will actually *build* the slug from the ARV and then repeat yesterday's successful procedure. If successful, will add ATV and repeat. Chris P. has ordered more fluorescent dye. When it arrives we will do a final test of the optics ourselves before we (most likely) must send the block back to LLNL.

4K issues

- Quote for casting the 4K sphere is here: [Wah Chang](#) and the quote for machining it is here: [Tapemation](#)
- BOM for sphere, fittings, elevator, all accessories still being formulated. Plan to meet with Chris S., Scott, Jim next Tuesday to discuss BOM of 4k and DWSM

ESP weekly meeting (Dec 20, 2007)

Present: Cheri, Scott, Chris P., Jim, Addie, Chris S.

Tech Transfer

Light seals changed?

yes

- Status of slow-running intake

Need to check this out with GG. Science may not be needing it; Chris will Check. Scotts concerned that lower pressure sensor has changed its calibration by 50%. Would like to remove it to look for fouling. Chris mentioned 'blowing-up' a fragile bug because of larger pressure differential; sensor could be culprit.

ACTION: is science finished with GG (Chris S)

ACTION: remove GG lower pressure sensor and examine (Scott)

- Status of manipulator hands. How many needed? How many made? Where are those installed? Waiting on any parts for hand?

Still futzing with first redesigned hand. Very touchy assembly. Have 3 built but have found a problem with cam motor-mount.

ACTION: meet with Mike Parker to discuss the cam assembly and redesign of the cam motor mount. Decide about the assembly (Scott)

- Status of motors and motor-mounts?

Have all motors. Have all mounts. Mike is modifying encoder gears.

- Any questions about published timeline?

Will be using piezo-arrays for all these testings.

ACTION: Need a Gantt chart of instrument usage (Jim)

- Status of cold-rated syringes?

they sent a drawing of what they planned on doing (2 weeks ago?). Scott replied; do it. Haven't heard from them yet.

ACTION: call and find out where they are (Scott)

- Status of Dwarf Board order?

ACTION: Must check with Jose. He's adding up inventory. Will need enough for 2 cores and 8 MFB and spares (at least 1 full core and enough spares for 8 MFB's[3 dwarves, 2 R's]). Tally up, look at production run, and scale up for best economy. Will place order early January. (Scott)

- Discussion of IP tech transfer w/ LLNL?

Update: we have written agreement with LLNL that UH, WHOI, is aproved. Foreign use is unknown and Patrice is looking into it. Valve design TBD

ACTION: Clarify IP on valve design (Chris)

MFB

- What will be MFB status as of 12-21-07?

Solid phase extraction working well. Running through lysate coil on AIV. Slug still shows a gradient, first 100ul good, second 100ul (over column) has high concentration. Going to try just pushing 100ul through. Unable to find mixing chambers, so will only take 100, push to and fro a few times and it'll be mixed. Chris P thinks it may be TOO concentrated, bench recovery is 12-25ug, and extrction is 25ug minimum. Still tweaking this. This will be January focus. Standardize the protocol for this.

- When will all parts be in for 2nd MFB?

All parts are in except MAXON motors. Cheri ordered 33 total, 27 for her and 6 for Addie (who has used 4, 2 are around MBARI) and needs to order 6 more. Cheri will use 24 w/ 1 spare apiece.

ACTION: place order with MAXON for MFB spares (Addie)

- What is left in extraction protocol? Finalization of protocols will be early January.

Chris Scholin hosting CMORE workshop Jan. 14-17 (35 people from OR, HI, WHOI) to define functional requirements for our and other partners CMORE work. Suggests that we clean up MFB and put on cart, and do a demo run. Get rid of power board and zip tie things and tubing wraps, etc.

Discussion about LLNL, when they will get a new block to us. If we get the driver block, we should have it out for display.

Discussion about PSV valve. Addie will add the PSV valve. Discussion about connections b/w core and MFB.

ACTION: Should talk to VICI about putting new connector in AIVports 3, 5, 6, to allow us to connect to 1/4-28 core fittings. Or see if we can use existing MFB tubing and see if compression fitting works to the 1/4-28 connections. Addie will figure out how to connect ports 3, 5, 6 with no bubbles. (Addie)

ACTION: Lubricating syringe. Must be 'upside-down' to prime with no air bubbles. But then could rotate 180 so it retains lubricant. Investigate remounting this right-side up after priming (Addie & Scott)

ACTION: Change PSR name to ASR and change scripts. We need a naming convention for the 3-ways on the MFB. Brent needs to be brought in on this (Scott will email)

Software

Brent gone until Jan 2nd.

Sphere and 4K DWSMS

- Sphere ordered by Jon Erikson on Dec 13, 2007.

Funny Money Expenditures

- Currently getting quote on 3 cans/endcaps; do we need for current year?

We have two complete surface moorings (although one can is a 'spare'). Will turn off mooring hardware PO from 2006.

- Pucks?

Mike will have a quote tomorrow.

big expenses should go through Chris S for spreading charges among accounts.

Issues from Doug:

- Serial numbering of pucks.

ACTION: Collect and inventory all pucks (Chris S to get Nilo). Then will send 1/2 to Mike Parker to be etched (Scott)

- Image reflections on puck. Still an issue?

no

- Concern on cleanliness of SSfittings off deep chamber

We are only using electrical connectors, not fluid connectors. May have to order fluid fittings for 'box test'.

ACTION: look into need for new fluid fittings and order if necessary (Cheri)

- Pressure pots; rust source?

Will clean and should be okay.

ACTION: Cheri to get pressure pot sizes to figure box structure. (Cheri)

ACTION: Pressure posts. We want this inventory: 2 fives, 2 tens, 2 threes. Must order enough to reach this inventory (Chris P)

- Battery/power issues for spring deployments

stick with alkaline. Do we need more boxes? Need 4 boxes initially. Not working on low power issues. Must order minimum of 1 box of batteries in early 2008.

4K stuff:

1. I have lower, more reasonable quotes for the sample chambers, but

they're trepanning solid stock so it's still pricey. It is something that we could do or have El Camino do instead. I'll need to touch base with Mike to see if it's worth while. Maybe a competitive quote from El Cam.

2. We don't have a lot of time (20 weeks lead time on these) but I'm looking into a steel housing to proof the system before. End caps and penetrators would still be TI, but \$40k would buy a lot.

3. I've made some small (but measureable with an interferometer) progress on the 1k article.

Timeline (This schedule is its own page in Confluence):

1. Cold Test Bruce with his new hand and re-valve Mack with new motors and mounts (2 weeks; Dec 31--->Jan 15)
2. Cold test Mack w/ his new valves/hand and re-valve both Bruce and Neo (2 weeks; Jan 15-->Jan 29)
3. Begin 1 month test in chamber with MACK (~4 weeks; Feb 1-->Feb 25)
 - * Cheri to design and construct box
 - * Use fittings from deep canister
 - * sample pressure pots
4. Prep for Spring deployments (Feb 25-->Feb 29)
5. Deploy MACK (March 3)
 - * Cold test Bruce (Mar 3 - Mar 17) and Neo (Mar 17 - Apr 1)
6. Recover MACK, Deploy BRUCE (Apr 1)
7. Recover BRUCE, Deploy MACK (May 1)
8. Recover MACK (May 27), Deploy both BRUCE and NEO (May 28)
9. End mission Jun 30.

Cold testing of Bruce is really just 'hand' cold-testing. Valving and tubing tests commence with Mack.

Items Pending:

battery box

stedim bags for aqualung

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor.

Three new surface cans for 2008

29Nov07

This page last changed on Nov 29, 2007 by [jbirch](#).

Engineering weekly meeting (Nov 29, 2007)

Present: Birch, Harris, Scholin, Everlove, Pargett, Roman

Tech Transfer

- Status of Bruce and Mack (and Moe)
- New hand construction update
- Status of new motors/ new motor brackets
- Cepheid coming Friday?

Bruce and Mack are 97% assembled. Both lack hand, which only has slider issue to resolve, and all can be modified. Have ordered more blue nipples and tubing; should arrive end of this week (tomorrow?). 27 Maxon motors shipped yesterday. El Camino has not started machining new motor brackets because they lost our PO and the job fell out of que. Mike Parker will push to make them meet their original Dec. delivery date.

Cheri to order enough syringes to completely outfit Bruce, Mack, Moe, plus have a spare set. These are COTS. Scott still working to get custom, cold-rated syringes built. Break charge in thirds among 800560, 703506, 900612.

New motors to be placed on Bruce, Mack, and Moe; no changes to NEO and GG. Dwarf boards--we have enough for Moe, but then no extras. Must meet with Scott about new order.

Cepheid IS arriving for visit tomorrow, 10am.

Chris S. says NOPP proposal generating much interest in PCR module. Sandia, Stoneybrook, U Maine all have detection technologies they would like to use with our fluidics layout. We must clarify IP issues with LLNL about transfer of fluidics (not PCR) technology to other parties. Also will impact how many dwarves to order. Have requested letters of support from us for their NOPP proposals. WHOI is taking our specifications for syringe assembly for their in-situ flow cytometer. A similar tech transfer agreement can be made to these other institutions once IP with LLNL worked out. Don Kennedy here next Weds; Chris giving a tour with NEO in test-tank area.

MFB

- Status of adding AIV and new ASV
- Mounting of solid-phase extraction hardware
- Status of new script development
- Heater block sent to LLNL
- Prediction for 12-21-07?

ASV now mounted and Addie's pushing water through. AIV still waiting on mounting brackets from El Camino. Script written to control valves without AIV. SPE mounted and moving water. Heater is easy to control. Chris has rec'd 12 more small columns and 12 holders. Addie will get one to Mike Parker to build another heater. PCR heater sent back to LLNL on Tuesday (11-27) and FedEx has it arriving 11-28 at 9:01am. Still to hear from Tony if it arrived. Hope is to have SPE working by 12-21. Fluidics will be ready by tomorrow. Then it is biochemistry testing.

Must still develop decon script for the SPE column/tubing.

Software

- Tracing the Ruby garbage error...
- Plan for low power processor visit
- Progress of Bob Herlien on MFB drivers?
- Progress of Rich Schramm on GUI?
- JIRA?

Brent able to reproduce the error, but cannot identify where it is occurring. Took debugging scaffolding and ported to run on the core processor and now is able to reproduce the error in a repeatable spot. He knows the structure and block that's getting messed up; perhaps modifying C-debugger to run code slower...

Work this week/end at pushing pucks through and reproducing the error. If no progress by Monday, then work on creating a 'test case' that would allow sending to other developers, who would run this code without the need for hardware.

Low power CPU visit postponed, but decision to change to lower powered CPU will wait, as the market is already moving in that direction. With this 'job' off the table, Jim will visit with Wayne R. about his timeline in 2008.

Bob Herlien has PCR driver multi-threading finished and awaits hardware to test in on.

Rich Schramm pulled off ESP GUI development for 2 weeks for MARS work; we will get him in January. Plan is to use GUI during spring '08 deployment, which means we need it to fiddle with by ~March, '08.

Sphere and 4K DWSM

- Ordering sphere
- Still awaiting machining quote from Hanard Machining, Oregon.
- DWSM---need for mechanical design (Doug's return?) Jim will start PO process for sphere today. Jon Erikson will be contact (backed up by Mark Brown). Hanard has (as of yesterday) not completed their machining quote. Doug will begin DWSM work when he returns in January.

2008 Deployments

This page last changed on Oct 30, 2008 by [jbirch](#).

Deployments as they happened:

First network deployment

April 3 Deploy Mack (M0)
April 21 Recover Mack

May 1 Deploy Mack (M0)
May 12 Mack craps out (syringe sticking)
May 15 Recover Mack and can swap with Bruce
May 27 Recover Bruce
May 28 Deploy Mack and Neo (SC and M0)
June 30 Recover Mack and Neo

MB08 Deployment

October 8; Deploy Mack to Santa Cruz, Neo and Bruce at M0
October 27; recover all

2008 Meeting Notes

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13. [27Mar2008](#) (Pre-deployment mtg)
14. 03Apr2008 (no mtg--1st Mack deployment)
15. [10Apr2008](#)
16. [17Apr2008](#)
17. [24Apr2008](#)
18. 1May2008 (no mtg-2nd Mack deployment)
19. [8May2008](#)
20. 15May2008 (no mtg-Bruce swap for Mack deployment)
21. [22May2008](#)
22. [30May2008](#) (Moved to Friday)
23. [5Jun2008](#)
24. [12Jun2008](#)
25. [10Jul2008](#)
26. [17Jul2008](#)
27. [25Jul2008](#) (Moved to Friday due to McLane visit)
28. [31Jul2008](#)
29. [07Aug2008](#)
30. [21Aug2008](#)
31. [28Aug2008](#)
32. [04Sep2008](#)
33. [11Sep2008](#)
34. [18Sep2008](#)
35. [25Sep2008](#)
36. [02Oct2008](#) (Pre-deployment discussions)
37. [09Oct2008](#) (the day after deployment....)
38. [16Oct2008](#)
39. [23Oct2008](#)
40. [30Oct2008](#)
41. [06Nov2008](#)
42. [13Nov2008](#)
43. [20Nov2008](#) (Scott's in charge)
44. 27Nov2008 (no mtg--Thanksgiving)
45. [04Dec2008](#)
46. [11Dec2008](#)
47. [18Dec2008](#) (Brent's in charge)
48. 25Dec2008 (no mtg--Christmas)

Thanks to Scott, Brent, Roman, and Cheri for the long hours last night bringing Neo and Mack back to life...

Deployment Update

- MOB Tuesday PM, depart Weds morning 06:30. Crew will be Chris S., Roman, Scott, divers: Lonny & Mike. Crane operator Luis, with x-tra pay for childcare/OT.
- Will deploy one @ MO, travel to SC, then back to M0 (allows 1 hr b/w each dive for divers)
- In water will fire off full-phase. Then rest and start on 11th.
- Moorings: lots of little things still to do, but coming along nicely.
- **The Plan:**
 - Mack and Bruce will be canned tomorrow (Friday). Bruce will be moved to it's mooring in preparation for radio testing.
 - Brent will radio test Mack Friday.
 - Saturday, Chris P will load PCR reagents on Neo. Then start a 24hr run lat Sat, making sure to do a full MFB with BAC run. This will confirm all reagents are good. **At start of this run will note power on Watts-up meter so we can get a power usage estimate for a full run.**
 - Neo gets canned Monday
 - Dual radio testing for Neo/Bruce Monday.

Machine Builds

- Dwarf Boards:
 - Dick soon to go on 2 wk vacation
 - All boards tested. 6 R-valves fail. Failures came on motor tests. Could be Xilinx solder joints.
 - Wayne writing a 'theory of operation' for dwarf and R-valve boards
- Issues with cores:
 - Mack: replaced a dwarf board yesterday when it was acting unreliable. First board to go bad in long while.
 - NEO: Brent fixed jittery Sample syringe brought about by too slow a minimum speed for integrator to adjust to. This change may need to be carried to all cores.
 - Brent noticed hand could not extend all the way. May be a calibration/config issue; will work with Scott on this
 - Software: issue with getting emails outside our firewall; Brent chewing on a fix for this.
 - Chris wants to run short IPC and SAR 11 to see if column is working. After that, run some negatives to show it's clean. then fire off a full SHA.

MFB

- Grill progress stalled until Mike gets freed up. Addie asked to put in formal requests for work to get into que.
- New MFB user's manual will be on Confluence Friday or Monday.
- New LLNL module not tested; waiting on SPE heater block from Mike

Software

- New CTD's have different firmware. Nontrivial.
- CS syringe on NEO has been changed
- Bruce--got stuck last night. Anytime tried to move a syringe or valve it hangs. It waits for a thread that's already dead.
- Mack--PS and clamp got corrupted (overcurrent errors). Sent out a 'recover' and it fixed it.
- Can't seem to FTP into shore station from his house
- Radio tests worked well, but while one file is uploading, link is monopolized (we can't talk to the other machines)
- Will give radio's to Jose
- Home syringe has been renamed.

- Firmware code still not frozen until Brent fixes: 1. Recover from hang due to dead thread, 2. Link protocols fixed, 3. CTD changes made

DWSM

- Sphere bottom (2nd casting) is finished w/ rough out; needs finish work and ports milled
- Sphere top (1st casting) won't make shape, but machining adjustments will make it acceptable (or we'll de-rate it)
- Should be finished in 2-4 weeks
- Bulk-heads (swiss cheese plates) are in the mill and being processed.
- Doug soon to deliver large PO for Pressure transfer barrier (accumulator) for \$6K
- **Elevator ideas:**
 - will have roughly 6'x6'x8' size. Lobos crew thinks size will be fine
 - Doug believes 4 leg will be more stable than 3
 - Foam pack findings:
 - 40lb/ft³ will be \$16K; 28lb/ft³ will be \$20K; Glass spheres will be \$10K but much risk
 - will go with 28lb/ft³; they say ~January delivery. Buying in brick format so useful for others after ESP project ends.
 - Much brainstorming about elevator design, working at angles, how to counteract uneven surfaces, etc.

GUI Development

- Kevin working with Chris Preston on the new 'killer' mission planning app; Chris having trouble running on her home machine
- data management software should be finished tomorrow.

Other Items:

- Doug provided a 2009 deployment breakdown. Chris, Jim, Doug will discuss off-line before approaching Grech about schedule.

ESP Engineering Mtg -- Jan 3, 2008

10:30am-12

Present: Jim, Cheri, Addie, Brent, Doug, Scott

Tech Transfer

- Cheri; plan for hand cold-testing/re-valving by Jan 15

Bruce in chamber on Monday and running a shuffle (looped). It had stopped with forearm errors. Brent will help find when/why crashed. Restarted shuffle on Weds, but after awhile if gets worse and worse and stops. Does it both in cold and at room temp.

ACTION: Brent will show Cheri and Addie how to read log ([Brent & Cheri & Addie](#))

- Status of slow-running intake on GG

GG's pressure sensor broken. Found that the clamp holes were too small, and installation torqued the sensors so they were wrongly calibrated. Our fix is was to recalibrate when clamps are pressurized, but this masked the real problem. Not that pressure sensor mounting holes are correct, must run a sample on GG to see if it's similar to NEO.

ACTION: run a sample on GG to compare to NEO ([Scott](#))

- Status of manipulator hands

Have one hand but lots of calibration issues. Parts for other two hands still on hold until first one works. Mike currently working on valve motor mounts and gears.

ACTION: meet with Mike Parker to discuss the cam assembly and redesign of the cam motor mount. Decide about the assembly ([Scott](#))

Will get one hand working then build 3 more. Cheri discussed the design of the linkage which make the hands not move together when they close. Currently all arms are the same (non-ideal) design.

ACTION: Will rev the drawing and have El Camino make enough to retrofit all hands ([Doug](#))

- Drill out pressure sensor holes in clamps

ACTION: Will do this when we revalve the cores. ([Scott/Cheri](#))

- Status of cold-rated syringes?
sent an email but nothing back from company...

ACTION: call and find out where the company is in development ([Scott](#))

- Status of Dwarf Board order?

Jose adding up inventory. We will need enough for 2 cores and 8 MFBs and spares (at least 1 full core and enough spares for 8 MFB's[3 dwarves, 2 R's]). Tally up, look at production run, and scale up for best economy. Will place order early January.

ACTION: check with Jose and Tom ([Scott](#))

- **CMORE workshop Jan. 14-17;**

- roll-up core and MFB to Pacific Forum
- clean B125 lab
- clean up MFB (get rid of sleepy/medusa of wires/tubes, have a 'show' script)

Will take sleepy off MFB and give to Brent and substitute with dwarf, and Addie will work on cleaning and gussing up MFB

Final Tech Transfer Issues

The plastic chamber box; should be as near the volume of the cylinder as possible. Will not be using endcap since it doesn't fit. Talk to Jim S. to build the box.

Connectors; have researched how to populate the lid--only one power, ethernet, console, contextual sensors (3), modem, external sampler. Will remove these from the 1K housing.

ACTION: move connectors from 1K to the test box ([Doug & Cheri](#))

MFB

- Update on solid Phase Extraction. Protocol development?

SPE working well now. Further protocol refinements will wait until Chris P. has submitted her paper.

- place order with MAXON for MFB spares (Addie)

Ordered. just need the PO approved. 6-8 week lead time.

- Update on PSV valve addition and connection w/ core
- Should talk to VICI about putting new connector in AIVports 3, 5, 6, to allow us to connect to 1/4-28 core fittings. Or see if we can use existing MFB tubing and see if compression fitting works to the 1/4-28 connections. Addie will figure out how to connect ports 3, 5, 6 with no bubbles. (Addie). They have been called; waiting for response.

- Report on syringe lubrication. Success?

Has lubed it several times, but still getting trajectory errors. The motor is at the edge of it's capability (moving almost TOO slowly). Addie has 2-3 motors with bigger gear box, 2-3 with better encoder, and 2-3 with both.

ACTION: will try many of these motors, then work on flipping. Must get to the slow speed of 1ul/sec. ([Addie](#))

ACTION: Change PSR name to ASR and change scripts. We need a naming convention for the 3-ways on the MFB. Brent needs to be brought in on this ([Scott/Brent/Addie](#))

There was discussion of running our reagents out at LLNL to see if we can emulate their results, but with our reagents. Will discuss with LLNL.

ACTION: talk to Tony and get timeline on next MFB ([Jim](#))

Software

- Status of current Ruby version. Close to lock-down?

Brent has written a fix that is more efficient when bouncing between threads. So no garbage collection issues now. Was unable to recreate the error with DWSM, but found a problem with driving the I2C bus with a fast laptop--maybe something related to how quickly data is driven to the serial command bus.

Ruby interpreter is stable for this year. As close to 'frozen' that we'll get.

ACTION: Set-up sleepy board and an elmo on desk to emulate ([Brent](#))

ACTION: change laptops and ARM boards and install the new Ruby interpreter ([Brent](#))

ACTION: working on a cue of interrupts in the threading environment--[low priority] ([Brent](#))

ACTION: Work with the auto-cal code ([Brent](#))

- Issues for Wayne:
 - o Low power CPU replacement
 - o USB camera porting from Kernel 2.4 to Kernel 2.6
 - o Improve dwarve DC servo control algorithm
 - o Improve ESP hardware simulator (Ruby)

Low power CPU being put off until after spring deployment. Sirius (sp?) chip may work, but Russian company has a great sleep state DRAM board. From now to March, we should explore both these options. March we make a decision, and then bring in Wayne the help with the implementation.

ACTION: Speak with Wayne about his timeline with BIOSA and his ability to commit to low-power studies for us. ([Jim](#))

Sphere and 4K DWSMS

- New order of Pucks placed? Charges went through Chris S?
- Serial numbering of pucks

ACTION: Collect and inventory all pucks ([Chris S to get Nilo](#)). Then will send 1/2 to Mike Parker to be etched ([Scott](#)). Still be to done.

- Pressure pots. Ordered 1 five, 1 ten.

- Battery/power issues for spring deployments
stick with alkaline. Do we need more boxes? Need 4 boxes initially. Not working on low power issues. Must order minimum of 1 box of batteries in early 2008.

We need a total of 6 boxes for the spring deployment, and have 5. 4 of those 5 are D-cells. Two boxes will run around \$4K (without batteries)

ACTION: Buy two boxes, populate with D-cells. One with lead-acid will remain lead-acid. ([Scott](#)) [Jim](#) get account # to charge.

- 4K DWSM update
 - o machining
 - o proof of concept steel housing?
- Progress on 1K article?

Will not use Ti for the sampling system. Until we prove the aqualung works, no need to make out of Ti. So will make out of SS for around \$8K for the housings. Next month we'll build up a plastic system we can run up to 100psi.

ACTION: will try and have model done by end of Jan--depends on pumps ([Doug](#))

Items Pending:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor. **ACTION:** how will BIOSA integrate and drivers needed (Brent & Wayne)

Three new surface cans for 2008

ACTION: Get quote from Gene and place order ([Jim](#))

Timeline (This schedule is its own page in Confluence):

1. Cold Test Bruce with his new hand and re-valve Mack with new motors and mounts (2 weeks; Dec 31--->Jan 15)
2. Cold Test Mack w/ his new valves/hand and re-valve both Bruce and Neo (2 weeks; Jan 15-->Jan 29)
3. Begin 1 month test in chamber with MACK (~4 weeks; Feb 1-->Feb 25)
 - * Cheri to design and construct box
 - * Use fittings from deep canister
 - * sample pressure pots
4. Prep for Spring deployments (Feb 25-->Feb 29)
5. Deploy MACK (March 3)
 - * Cold test Bruce (Mar 3 - Mar 17) and Neo (Mar 17 - Apr 1)
6. Recover MACK, Deploy BRUCE (Apr 1)
7. Recover BRUCE, Deploy MACK (May 1)
8. Recover MACK (May 27), Deploy both BRUCE and NEO (May 28)
9. End mission Jun 30.

This page last changed on Dec 09, 2008 by [jbirch](#).

Present: Scott, Doug, Chris S., Jim, Addie, Brent

Absent: Wayne, Cheri, Kevin

Machine Builds

- Allison replaced Mack o-rings with silicone (red ones); Roman doing dunk test in various reagents.
- Procedure when 'getting' any boards is to notify Dick Littlefield, who is the inventory keeper. Addie to let him know of the boards she borrowed from Wayne.

MFB

- Addie has rec'd doctors instructions for bed rest until she has her baby, thus will not be returning to the lab after today. We will continue with the McLane visit using Cheri and Scott.
- Addie will change the stator and install Scott's taffy pull mixing tube on MFB1 so we may run PCR next week when Kendra comes to visit (Friday).
- We will order 9 regular 14-port stators
- First grill is called MFB1, MFB2 & MFB3 will be built with McLane. The MFB on the tombstone is called either 'MFBNeo' or 'the tombstone'.

Software

- Garbage clean-up fix seems to have worked.
- Brent working on multiple config-file issues regarding linking MFB to a core
- Must make sure back-plane and grills are labeled, so config files stay linked to the appropriate grill
- We will visit check-out scripts with stops after the holidays

DWSM

Sphere

- Sphere dye tested (passed) and is returning from Wah Chang. Arrive tomorrow (Friday) or early next week.
- Much discussion of what we should pressure rate to. Depends on where we send it; 3000m will get to 90% of known vent sites. Port H. can test to 3700m. We will probably not go deeper than 2500m; Chris to talk to other ASTEP PI's. When we see what they want, we'll pass info to Doug, and test for that.

Elevator

- Doug finished a 'walk-about' PDR with ship crew about what would work re: elevator design
- CDR for final elevator design; try to do by end of next week.
- Doug has calculated size envelope, weight balance, Center of Bouyancy, Center of Gravity.
- Leveling system should work fine to 8degree slope

DWSM

- All tubing is finished; just 4-5 days left for assembly. Progress slowed because of time put into elevator design.

GUI Development

- Nothing

Other Items:

- For January: must revisit puck order for both MOE and for 2 more cores coming along. Also HV puck design. Will talk to Mike Parker about this upon his return.

- Discussed attending JALA for Brent and Scott. Will decide Monday who wants/is willing to go.
- Much discussion about moving our deployment dates. If we can change current schedule, plan is as follows:
 - - Dive 1: March 25--no core but elevator, DWSM, sphere
 - Dive 2: April 7-core in sphere, elevator, DWSM-run WCR
 - Dive 3: April 14-core in sphere, elevator, DWSM-minimal chemistry (SHA)
 - Dive 4: May 1-4--plug into MARS (date depends on what we can get that first week)
 - Dive 5: 1-3rd week of May – pick up from MARS
 - JUNE 8-12--Flyer cruise (these dates may be moved a few days earlier, depending on DMO scheduling changes)
 - AUG 16-26--Flyer to Axial
 - Dive 6: Nov 4--plug into MARS, pickup in early 2010

Schedule Items

- October deployment:
 - Using Shanna Rae; MOB on October 8 (Weds), deploy October 9 (Thurs).

Machine Builds

- Problems with Mack and Bruce have been resolved since SC visitors. Thanks to work by [Scott](#) and [Roman](#). Still noticed forearm slide on Mack needed to hammer each time. This issue should be resolved in next build when we use different slides.
- Still need to mock-up and test new communication protocols to be used during October deployment. [Jim](#) will check with Science to see when machines are free for this.
- [Scott](#) still working on testing puck sensor boards when he has time. These will not be implemented until after Oct.
- MOE update: easiest to plumb from inside out, and [Cheri](#) still waiting on the custom AIV stator cap. Thus, plumbing put aside and she's been building manipulator arm; mechanical work finished, finish wiring today, start testing; hand should be finished early next week.
- 3rd Mooring: all parts are fabbed. [jim S.](#) will start building next week or as soon as his immediate FOCE duties are finished.
- [Dick](#) checking Sleepy boards, has not started on dwarves yet. As a way to get up to speed, [Wayne](#) will insert himself into the QC process of sleepy and dwarf boards. Scott noted that Dick may have jury duty Sep 15/16.

MFB

- [Mike P.](#) has started looking at mounting tombstone (TS) to NEO. Should be mounted by end of next week.
- Grinding noise of ATV was deemed inconsequential. Much discussion about removing detents from valves.
- Sealing around mixing column was discussed. This should be something Chris/Addie/Jim/Scott brainstorm about.
- [Addie](#) and [Chris P.](#) working on test-plan for MFB/NEO integration.

Software

- Due to Wayne's knee surgery, antenna mounting moved from Sep 6 to either Sept 12 or 13.
 - Plan is to make 1 visit. Brent assembling parts necessary and will bring extra router in case we cannot access the one on-site.
- We will clone the 'server' in Brent's office (Bufflehead) to a machine lifted from A244 Lab. Wayne can then use this in his testing of boards.

DWSM

- Bell housings have just been turned, ports cut, and may have to be sent out of state for anodizing. [Doug](#) will lean on El Camino...
- 2" Ti plates are here and in queue for cutting into swiss-cheese plates. [Jerry/Ray](#) have the drawings for 1 plate; Sample plate drawing (easier) should be finished by next week.
- Oatmeal can is about 20% finished. [Will](#) be able to CNC cut the threads on it.
- Several pump parts are here and can be load tested for power draw.
- connectors not ordered but [Doug](#) thinks they will be here quickly.
- valves not ordered yet
- complete DWSM instrument will be assembled by end of year.
- Building a high-pressure test interface will cost ~\$10K. [Doug](#) given advice to charge this to ASTEP, but charge may be split among several funding lines. [Jim](#) and [Chris S.](#) to meet about this.

GUI Development

- Kevin out sick today, but lots of Confluence activity....

Other Items:

- Diver needs and deployment logistics are still be formulated...
- We are doing well on the [calendar \(bottom of page\)](#)

ESP Engineering Mtg -- Mar 6, 2008

10:00 am Present: Pargett, Jensen, Marin, Everlove.

Tech Transfer

Discussion Items:

Mock fridge mission, 3/12 to 3/19

Loading and QC of reagents on Monday. Puck loading on Monday. Mack going into the fridge on Tuesday.

Still need ISUS, have CTD, need to be battered and programmed.

Scott will test GPS tracking outside, won't be active during mock mission.

Mike will make more valve drive bushings out of alumingum.

MFB

Not discussed.

Software

Not discussed

Sphere and 4K DWSMS

Torque testing shows we can get the LVLP pump on a dwarf, the HVLP will be marginal, and the LVHP will need a seperate amop. Scott is working on that arrangment.

GUI Development

Not discussed

06Nov2008

This page last changed on Nov 06, 2008 by [jbirch](#).

Present: Scott, Doug, Addie, Kevin, Jim, Cheri, Brent, Wayne

Absent: Chris S (in China)

Machine Builds

- Moe now has GG's harmonic drive part of the hand. Cheri noticed that GG's lower hand is sticky; could be slider, could be bad motor.
- Bruce leak. Found that o-rings in processing clamp were noticeably cracked; replaced and re-ran; Nilo said new photos look good. Discussion with Doug on a different material that would not crack with our reagents.
- Mack; flush puck may still be stuck as it hasn't been used. will check after lunch
- Cheri busy ordering parts for other two cores.
- One cart has a flat tire.

MFB

- Jose currently busy, but will be available in 1 week to do wiring harnesses; he'll build 2, send rest out for manufacture.
- Parts ordered for serial connector to core; should be here Monday/Tuesday
- 2nd grill: Addie writing scripts for PCR and SPE
- Encoder/Dwarf; Addie had interesting problem where MFB froze, but after shutting several open windows, control was regained.... Dwarf losing thje encoder count has not occurred again, but unclear why. Rebooting fixed.
- Chris P. has run plasmids on NEO MFB, and now negatives are coming up positive. She still needs to do a full-decon, and may require longer hot bleach times.
- Chris P. is setting up for a BAC superphase, to be run with debugging on. Much preparation, so the actual run may not begin until Monday.

Software

- Xilinx issue; Brent and Scott working in bldg B to try and understand how encoder counts are being lost/dropped
- Jim (and possibly Roman) are starting a Ruby commenting project. Ultimate goal is to write a 'users manual' for the ESP.

DWSM

Sphere

- Wah Chang has been notified of potential repair and is looking into their policy. Regardless, we will ship the sphere back to them for dye testing to make sure there are no other surface voids that HIP could not eliminate, but we can't see.
- Tapemation should be finished with machining this week. Doug to check.
- Min-K delivery has moved from 6 weeks to 11 weeks (ordered 9-22-08); Scott has called and waiting to hear compny update.
- Pressure test facility information (from Mark Brown):
** [Hi Mark,](#)

Given the size of your housing it will fit in our 72" dia pressure vessel which is rated for 5,400 psi. It was rated for 5,500 psi but the Navy Hyperbaric System Certification people said we had to have put a relief valve on the vessel that is rated at the max working pressure (5,500 psi). To be on the safe side, we only go to 5,400 psi.

The daily rate is still \$1,800 until Jan. 1, 2009 then it will be \$2,100.00. December is open except for the week of the 8th and from the 25th till Jan. 5th.

If you need more information then please give me a call or Fernando Ruiz. (805) 982-2054

Thanks,
Mark

Mark Wells
NFESC, Deep Ocean Simulation Facility
1100 23rd Ave
Port Hueneme, CA 93043

v (805) 982-1531
c (805) 766-8389
f (805) 982-1938

DWSM

- Doug has sent up warning flare that our first DWSM deployment is rapidly approaching (Feb. 23), and we should start upper level programming of DWSM in parallel with the lower level testing that can currently occur. Brent/Wayne/Scott working on getting both upper and lower level testing up and running.
- Many parts to be ordered for elevator.
- Doug wants first deployment to be test of elevator with surrogate sphere (weights) to test deployment/recovery procedures. The next deployment we should have sphere pressure-tested and can add to the elevator.

GUI Development

- Chris P. working with Kevin to better incorporate data processing within Alfresco

Other Items:

- Thanks to Scott for an excellent job at cleaning the high-bay post-deployment and also the Bldg B clean-up.



Remember

Please remember to use ESD straps in the bldg A lab, as most of its chairs and countertops have failed ESD testing. Dick Littlefield looking into seat-covers that are ESD compliant.

07Aug2008

This page last changed on Aug 08, 2008 by [jbirch](#).

Present: Jim, Brent, Scott, Addie, Doug, Cheri
Absent: Kevin, Wayne, Chris S.

Instrument Builds/Tech Transfer

- South Carolina person here **August 21-29** to run Mack & Bruce (Tina Mukulsky (sp?))
- Bruce temp calibrations finished and verified. Mack will be finished by the end of today.
- Roman will help with verification check.
- Wiring harnesses for CMORE/NSF/Moe are in and being QC'd. Will wait to order MFB harnesses when grill layout is finalized.
- Gripper board and puck sensor boards have very slight redesigns. Still waiting to determine how many of each to make, and whether we should switch out current machines with new redesigned boards.

MFB

- motors on grill working, but encoders not. (FRIDAY update: encoders now working)
- We must come up with naming convention of the MFB's for accessing via software.
- Will daisy-chain power from SPE to PCR module.
- Serial connection from PCR to either host card or a laptop.
- Much discussion of whether to include a host card on each MFB. Without the card, stand-alone MFB's will require laptop to run; they would be unaffected when attached to the core. While it may impact low-level software development to have a host-card on each MFB, the simplicity of a *complete* stand-alone unit for the external user dictates mounting a host card.
- We must build several Power Boards; will populate here at MBARI (Scott)
- Closed-cell foam being explored for insulating the SPE block

Software

- Brent has 2 radios working simultaneously; working on adding a third.
- Second in priority is the limit-switch testing, a critical path item for DWSM
- At LINUX expo, Brent talked to people about putting WiFi on mooring, good for 7-8 miles los. We should explore; perhaps contingency project in 2009 for Brent.
- Antenna lease agreement finished and out for comment. We will need to purchase serial cable to connect house to radio.

DWSM

- Sphere update--We have had conference call to Tapemation. They expect to get spheres on lathe in 4 weeks, completed by end of October. Mark Brown looking into pressure testing facilities.
- Doug has found affordable Ti screws. Will use 6-40's and tap sphere accordingly. Tapemation has been notified.
- No word yet from El Camino. Doug predicts 3 weeks for bell housings.
- Many parts sent to machine shop. Mark B told that DWSM stuff is top priority. 'Soup Can' probably sent to Tapemation.
- Most COTS parts are here--still need Mini-Con's, Swageloc, various connectors/cables
- Electronics--Boards laid out; Scotts miniEE review probably the week of Aug 18
- Doug to have informal discussion with DMO about weight balance issues related to the as-yet-to-be-designed elevator.

Other Items

- syringes. Scott has the new 1ml and 2.5ml but the 25ml leaked and were sent back. Klone had a plan for fixing, but that was 6 weeks ago. Scott will contact...
- 11000 D-cells; account # provided and order has been sent to Jose.
- Decision is to go with plastic radio boxes, but with larger tapped holes with no metal inserts. Scott will talk to Jose about their manufacture.

ESP Engineering Mtg -- Feb 7, 2008

11am-12

Present: Jim, Doug, Scott, Brent, Cheri, Chris S., Kevin

Absent: Addie

LATEST Deployment Schedule is [HERE](#).

Tech Transfer

Discussion Items:

- Results of hand/arm testing.
 - Brent wants to re-do some temperature calibrations with core placed inside box to remove air current effects. Will calibrate thermocouples this PM and get collection-side offsets tomorrow so science can start using on Monday the 11th.
 - This PM Cheri will also calibrate Mack's hand
- Mike Parker Machining list -- working quickly through it
 - Doug/Cheri worked on prototype of an adjustable temp sensor and will talk to Mike about it. Needs a priority. Will implement into Bruce, Mack will remain as is.
- New syringes.
 - Still not heard back from company
- Screens and scintered frits
 - Yesterday Scott sent plans to company for quote.
 - We will order enough screens for 6 instruments. As soon as we have screen costs, we'll know how much money we have left and order scintered frits accordingly
- Camera Discussion
 - Chris S. has found the 2x2 binning works well, so cameras will remain at f2.5 with ~2mm focus depth-of-field.

Action Items

Action Items from last week:

ACTION: check with Jose about number of dwarves to order (Scott) **In progress**: Jose has mad the first pass through and looks like all components are still available. Jose getting price and lead time on everything.

ACTION: syringes. Wait to hear from company final costs and order #'s and get sample of their new product. (Scott) **In progress**

MFB

Discussion Items:

ACTION: Addie to look at heating profile times to make sure we are not cooking our reaction. (Addie) **In progress**

Software

- puck heating control
 - Brent needs one more day to get a better approximation on the collection side. Needs another puck--should be finished today.

- Brent added code that reversed polarity of the motor encoders, since these new motor-mounts have encoder rotating opposite direction of originals.

Action Items:

ACTION: Write 'cheat sheet' showing new parameter available for changing during sample collection (Brent)

Action Items from last week:

ACTION: Set-up sleepy board and an elmo on desk to emulate (Brent) **In progress:** Can't find elmo but have other pieces.

ACTION: working on a cue of interrupts in the threading environment (Brent): **Low priority Not started**

ACTION: Work with the auto-cal code for carousal and alignment (Brent): **Medium priority Not started**

Sphere and 4K DWSMS

- Sphere update
 - Wah Chang has changed their procedure, and will only make one part, have it checked, then cast the second article. If something wrong with the first one, we will be 2 months late and must reschedule all the late 2008 deployments. If all goes well, 2nd half will be cast in June. Can get both from Tapemation in August. Send to Port Hueneme for pressure testing and get back mid-Sept.
- DWSM progress?
 - Aqualung up a running. It does everything except accurately measure volumes pumped. Finding correct pumps has been difficult. Doug has several backup ideas including going to a syringe/piston system. Stirring pump found to generate much heat when submerged in oil, as well as leach out lubricant/coating so several ideas floated to balance friction (and thus power consumption) and stirring capability. Maybe try lighter oil.
- Battery boxes? Scott still waiting to hear.

ACTION: Waiting for company to return yes/no on whether they can manufacture screens to mass instead of size. (Doug/Scott) **Finished**

ACTION: Order two battery boxes (w/out batteries)--~\$4K; account #701312.04: **In progress:** Scott waiting for lower price. Must order BATTERIES for deployment.

ACTION: Change cracked power connector on GG's lid (Cheri)

GUI Development

- Mission script GUI introduction

Kevin to meet with Brent to discuss mission script GUI.

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem
Chris P. and Brent need to address high volume issues for Sept deployment.

Thanks to the entire team for making yesterday's deployment...

Deployment Update

ESP Mack (SC)-- radio-link weaker than expected. Brent going to do some home tweaking to see if he can get better signal

ESP Bruce (M0)-- new CTD is not playing well with driver code. Possible solution has been pushed to it. Bob H. and Brent working on other solutions. Gaps in CTD data have no effect on ESP core runs.

ESP NEO (M0)--Linux kernel has frozen for a second time. It seems to take an exception, writes a log of it, try again, log again, and builds 30MB log file. Brent finally got in and restarted Linux. We used 3 pucks; 4 remaining BAC arrays are next up. This may be due to an updated SLP protocol with our old kernel...

Monitoring during this deployment

Chris S. and Brent will get all bad news; Chris email, Brent email and phone text. Cheri will receive bad news text messages as backup.

Chris P. will receive all messages via email, with the chore of looking for procedures that do not occur (not necessarily bad news).

Pickup date is Monday, Oct 27 with Shanna Rae. Will drive to SC, got get 'em, return to Moss landing.

Machine Builds

- Dwarf Boards:
 - boards that failed inspection (~30%) will be resoldered when Dick returns from vacation (Oct 20), and retested.
 - Wayne writing a 'theory of operation' for dwarf and R-valve boards and will meet with Brent to get an overview, and bounce ideas.
- Cheri: will provide a build schedule for Moe. This needed so we can plan the McLane visit(s) during the build of the next two cores.
- By the end of next week, Addie will have a total parts order for ALL remaining MFB's. We'll submit to a shop in San Jose as El Camino is too busy. This will allow a visit from Mclane for MFB construction in early December.
- USB Camera: new camera's are not backward (slower speed) compatible w/ our boards
 - We have a 2-stage decision:
 - talk to company about fixing their camera firmware to be truly backward compatible- Brent will try to get to them next week.
 - put something b/w the camera and our board that will allow USB 2.0 to work with our slower boards. These are commercially available.

MFB

Software

DWSM

- Tapemation machinist on vacation. No sphere work performed since last week
- Ray having difficulties with swiss cheese plate: our CNC not quite beefy enough; he and Doug working on a solution

GUI Development

Other Items:

Present: Doug P, Addie, Chris S, Cheri, Brent, Scott, Kevin G, Jim, Visitor-Jack Regan

Tech Transfer

- Mack running well so far. One week down!
- We will try and keep the late May dates for pickup and dual deployment. May 27 Pickup Mack, May 28 Deploy Bruce & Neo. As dates approach, we'll decide on two teams; one team to ready two instruments, one for Mack pickup.
- Bruce:
 - Temperature calibration on Monday after a weekend cool-down
 - middle of week do roman flush
 - end of week science gets it
- Cheri brought in reps from slider manufacturer. They have a model in which the races do not drift, but some parts of plastic. Unknown how this will respond to vapor environment in can. They left one slider, will send another, and we will begin temp and EtOH testing.
- Scott has prices on ordering/populating/building more dwarf and sleepy boards. Prices are as follows:
 - Core: each needs 5 dwarves, 1 sleepy. Cost \$7K for all components and wiring harnesses
 - MFB: each needs 2 dwarves. Cost \$2K for all components and wiring.
 - This is what we decided we needed:
 - Dwarf boards:
 - Moe 6
 - CMORE 6
 - MFB 14
 - DWSM 6
 - Spares 10
 - 4 Sleepy boards

MFB

- AIV hole sizes. It has been decided that we will order 10 custom AIV's, each with four 1/4-20 ports and two 10-32 ports. Rotors with custom grooves will have the 'larger' grooves to accommodate the 1/4-20 hole sizes. Addie will add DWSM components to any order she needs to place.
- Addie has found that the encoders we've been ordering are no longer made. Another manufacturer need be found. Group thinks this will not be difficult.
- Other things to order for big build:
 - SPE columns
 - motor gearing
 - motor coupler
- SPE heater still needs some design work. Then must do cold testing.

Software

- Low power boards. Decided that low power, long-term deployments were not on the schedule for the next 1+ years, so resources will be redirected to other areas (e.g., a robust core). Brent had suggestions on things we could continue to look into to lower our power draw (power down battery, slow the CPU, change our intake/out-take hardware).
- Cheri found bug in puck counting when there was an arm miscalibration. Fix to be tested on Bruce.
- Brent working on implementing on Bruce e-mail notification of problems
- Working on modification fo firmware for DWSM.

Sphere and 4K DWSMS

- Surface cans from IMT Precision.
 - Cans have been 'repaired' and will arrive next week
 - Scott to order lid connectors
 - Doug to order lid plugs for pressure testing
 - we will test with He and test tank

- Although out of spec, we will take one set of top/bottom lids. These to be tested once plugs arrive next week.
- lids to be moved to tin shed for storage until ready for use
- Doug to hold new DWSM design review in 2-3 weeks.

GUI Development

- Kevin to meet with Brent to discuss issues related to mission scripting.

ESP Engineering Mtg -- Jan 10, 2008

10:30am-12

Present: Jim, Chris S., Brent, Doug, Kevin G, Cheri, Addie, Scott

After today meetings will be 11-12am

Tech Transfer

Action Items from last week:

ACTION: Brent will show Cheri and Addie how to read log (Brent & Cheri & Addie) **DONE**

ACTION: run a sample on GG to compare pressures to NEO (Scott) **DONE**

ACTION: meet with Mike Parker to discuss the cam assembly and redesign of the cam motor mount.

Decide about the assembly (Scott) **In progress**

ACTION: Will rev the drawing and have El Camino make enough to retrofit all hands (Doug) **In progress**

ACTION: Will drill out pressure sensor holes in clamps when we revalve the cores. (Scott/Cheri) **In progress**

ACTION: check with Jose and Tom about number of dwarves to order (Scott) **In progress**: Jose still diggin through BOM to figure out what we can order (1/4 way through)

ACTION: discuss test box design with Jim Scholfield (Cheri) **DONE**: Jim and Cheri and Scott discussed design; he's ordering parts. Maybe end of next.

ACTION: move connectors from 1K to the test box (Doug & Cheri) **DONE**: Been pulled off 1K and now at Jim S (electrical). Fluidic connectors--we are going to use ones that Mike made. Doug thinks they are in lab downstairs.

ACTION: Clean B125 lab for CMORE visit (everyone)

Discussion Items:

- Surface can quote from IMT: 3 cans = ~\$37K

ACTION: cannot purchase on 708 grant yet. 701312.04 should take all cost. Change: Order only 2 cans (Jim)

- Mooring supplies for network deployment

No one knows everything. We can get by with 2, but we really need 3. Doug says it's 6 months of Jim S. time, but Chris thought 1 month. Discussion ensued on what was necessary and we agreed that we could get by with our two complete moorings with appropriate spare parts.

ACTION: confirm we have 3 swappable EM cables and purchase spares from 701312.04 (including labor) (Jim?)

- Update on test chamber and test chamber fixtures
- Arm status (see above)

Failure last week was due to an assembly issue on arm that caused binding. Reassembly found broken wires in home sensor. Friday was working great at 10 degrees all weekend. Checked Monday morning it looked fine. Lowered temp to 2C and Tuesday found ribbon cable home sensor cable was broken. There is a loop for a strain relief. Brent suggests mylar cable used in printer. Chris suggests a 'ticker' to count cycles so we know when things should be changed. Revalving has started on Mack; 7 of 8 have been done. Modifying mount on 8th one. Should be done by Monday.

We will use 'non-ideal' arms for Spring deployment, but when we order new hands, we will order the correct 4-bar holes.

ACTION: talk to Jose to figure a solution to broken home sensor cable. (Scott/Doug/Cheri)

ACTION: Contact MAXON about forearm motors (Cheri)

MFB

ACTION: Order custom valve heads (Addie) **DONE**

ACTION: syringe motor mount. Mount 'upsidedown' for better lubrication. Changing motor for better gearing/speed ratio. (Addie) **SEE BELOW**

ACTION: Change PSR name to ASR and change scripts. We need a naming convention for the 3-ways on the MFB. Brent needs to be brought in on this (Scott/Brent/Addie): **DONE**

ACTION: Sleepy board given to Brent, w/ Addie using a dwarf board (Addie): **DONE**

ACTION: talk to Tony and get timeline on next MFB (Jim): **DONE**

Discussion Items:

- LLNL schedule---Tony coming Jan. 23. **DONE**

ACTION: confirm with email to Tony (Jim)

- Syringe lubrication

Syringe motor has been changed to one with higher encoder count. Should be no problem to get slower speed; pin numbers were different (10 new vs 6 old). Brent and Addie working on calibrating it. Config file is now cleaned and only contains MFB stuff. Flipping syringe will allow lube to sit on top of plunger. Syringe will be flipped.

- Mixing column for extraction lysate. Discuss construction.

Cannot put PEEK 2ml ID tubing into our smaller fittings. But can use 1/4-28 fitting normally. So Addie instructed to build simply stand-pipe structure with PEEK. May look at Optimize.com who make HPLC mixing chambers to see if they have these chambers. Addie going to check out standpipe design/structure.

Software

ACTION: Set-up sleepy board and an elmo on desk to emulate (Brent) **In progress:** Can't find elmo but have other pieces.

ACTION: change laptops and ARM boards and install the new Ruby interpreter (Brent): **DONE**

ACTION: working on a cue of interrupts in the threading environment--[low priority] (Brent): **Not started**

ACTION: Work with the auto-cal code (Brent): **Not started**

ACTION: Speak with Wayne about his timeline with BIOSA and his ability to commit to low-power studies for us. (Jim): **In progress:** Wayne still on vacation

Discussion Items:

- Sampling technique. Greater pressure or 'pulsing' or both?

Brent has maxed the vacuum in the syringe without cavitation but unknown if this is how 'natural' water works. Chris can provide natural sample. To get more sample volume do we want to experiment with a greater deltaP?

ACTION: Chris to give Brent water sample for running next week. Test running on bench at various pressures and run lysate test to test effects of different pressures (Chris/Brent)

- Thermal control hardware. Necessitate a firmware change?

Scott has a new sensor setup. Goal would be to eliminate funny ramps in RUBY to avoid overshooting. These controls are already in the DC motor controllers, so should we use this control in the temp control?

Worry is it's a big change. Firmware/Ruby must both change. This started because we don't always 'get' to our required temperature; its a function of ambient in the can. Chris; if offset is pretty well known, then we could live with it, if offset is big, it could screw up our array results. We can change the hardware, but getting software changed over may take too long.

ACTION: Will change the hardware, and look at offsets (Scott)

This will dictate next step.

- Modification of friction compensation w/in servo code.

In progress, but not as important as heating offsets.

- Other software changes and test plan for their implementation

ACTION: Test pressure stuff (above); if problems, then heating stuff is dropped

Sphere and 4K DWSMS

ACTION: Collect and inventory all pucks (Chris S to get Nilo). Then will send 1/2 to Mike Parker to be etched (Scott). **In progress.**

Get Nilo to take lead on this with Roman oversight.

ACTION: will try and have model done by end of Jan--depends on pumps (Doug) **In progress**

Can readily put together plastic housing. Still working on type of pumps

ACTION: Get quote for surface cans from Gene and place order (Jim): **DONE**

ACTION: Order two battery boxes (w/out batteries)--~\$4K; account #701312.04: **In progress:** Scott waiting for lower price

Discussion Items:

- Serial numbering of old pucks
put this on Confluence
- Status of new puck order
One set (carousel) by March 3; we need to tell them when we need the next set.
- Order and manufacture of screens, frits, polysulfone
photofab gave too large holes so too weak. Laser cut would be more accurate. Give them (photofab) hard spec with feedback. Chris has info on the scintered frits and ordering specs.

ACTION: get inventory from Roman (Jim/Roman): laser-etch pore size for scintered frits

- Pressure pots ordered? Yes
- Status of 4K sphere: 2-piece pattern pictures sent to us: shipping them over to casting house
- Procurement schedule for next 2 cores

We don't have money from WHOI until late 2008. CMORE we're in the middle of that year

ACTION: discuss build schedule for next 2 cores at 1-24-2008 mtg (in two weeks).

GUI Development

Kevin updated on GUI development. He would like to use his GUI tool to generate a mission-script for the Feb cold-room test. He needs reagent volumes to get accurate usage display. We will want to generate mission script the last week in January. Will meet tomorrow (Jan 11) to discuss volumes with him.

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor. **ACTION:** how will BIOSA integrate and drivers needed (Brent & Wayne)

10Jul2008

This page last changed on Jul 11, 2008 by [jbirch](#).

Doug will be on vacation July 14-July 28.
Scott will be on vacation July 16-July 22.

present: Chris S, Addie, Scott, Doug, Brent, Jim

Instrument Builds

- Scott still to start work on ROV mate-able interface. Will 'interface' with Chad and Marko.
- Dwarf boards on track for a mid-August delivery.
- Mid-October is the Monterey Ocean Experiment (MOE), where we want to deploy Moe w/ PCR. Our backup plan will be to deploy the tombstone if the grill is not ready.
- Mid-August we will have SC visitors that will want to run Bruce and Mack very hard for two weeks. Mostly short DA runs. issues to deal with:
 - Bruce collection clamp issue
 - Mack hand. Scott thinks it may just be a rev of the hand (i.e., widening a hole)
- Must remember that Mack and Bruce are still using back-side puck temp sensors. Neo has been changed to front, as should these two eventually.

MFB

- Still waiting on encoder boards--due early next week.
- gears still to be modified; should be done today
- syringe mount missing two pieces from El Camino order. Addie checking with Mike. We may have one set made in-house so as not to wait.
- Will find two dwarf boards for the grill so not to slow Addie. One must be Rev. 2, Scott looking around for solution.
- Immediate solution to driving the grill will be to use Linux laptop that Bob Herlien has. Eventually will move to a more portable solution.
- Jim will email Tony asking for another PCR module
- Brent made offer to help with instant Ruby graphing of PCR module data, if/when Addie gets some downtime.

Software

- Much discussion about freeing up ESPShore space. 2 DVD sets and 1HD backup currently exist. *It was decided that files older than **July 2006** could be deleted.* Brent and Roman will be the deletors.
- Much discussion about radio link to M0. Brent has found a private residence that provides beautiful, unobstructed access and has suggested we offer to provide them DSL if we can mount antenna on their house. Chris S. looking into the legalities and if this would be okay with MBARI. Stay tuned.

DWSM

- Bell housings at El Camino. Doug found o-ring problem and has forwarded them a Rev C to work from.
- Swiss Cheese plate will not be finished b/4 vacation. Maybe EC will make blank and MBARI will do detail work.
- valves not ordered - only a 4-day lead time
- building a fabricated parts list.

Other Items

- ESP running next weeks BBQ. Jim will organize. Need 3 cooks/3 cleaners. Brent has offered a curry rice salad to go with our burgers and famous Costco cookies.

11Dec2008

This page last changed on Dec 11, 2008 by [jbirch](#).

Present: Scott, Doug, Chris S., Jim, Wayne, Brent, Kevin

Absent: Cheri (SolidWorks training), Addie (maternity)

Machine Builds

- o-ring test out. No results yet. O-ring in Mack was not sealing properly; needs exploring/explanation.
- Pucks. Have one set left to be etched, which will give us 4 complete snap-puck sets; all same rev, but different lots.

MFB

- Getting close to the end of the 2-grill build. 1 has had fluidics checked out; both have syringe and heaters calibrated
- Chris P running dye test on MFB01 now, may try and run PCR tomorrow
- Tomorrow AM will meet with McLane and map out the concepts of a visit for the core build.

Software

- Moving from development mode to more a manufacturing mode has caused Brent to re-jigger the config files on both the Core and MFB's. Each now has a PreConfig.RB, Config.RB, and PostConfig.RB, with the pre- and post- common to ALL MFB's; the Config.RB is unique to each unit. This change is also being implemented on the cores.
- Brent has discovered a file accessing issue with the CTD that will require Bob Herlien's help for a week in early 2009. This should stop the hiccup we've seen when hooking up new CTD's to the core(s).
- Xilinx issue still causing heartburn. Now using old code, with both old or new compilers, produces corrupted results. It has worked for many years, but now is flaking on us. Wayne to delve into what is going on--this is top priority since DWSM uses these same xilinx boards for quadrature decoding.

DWSM

Sphere

- Chris S. has found that near-term 2500m is max depth we may want to go. He has found that depth certification is very strict if Alvin will be near it (test at 150% 10x then hold 1hr at max). Much discussion on whether this is necessary, what would we need Alvin for, the need for a manual release. We want to go to maximum depth, but don't want the setup to become an engineering project in itself.
- DECISION: we will outfit w/ strain gauges and go to maximum (either of the test facility or to 3750m)
- Will get quotes from both Southwest and Port Heuneme; Will try and have tested in January.

Elevator

- Have learned that prime real estate near MARS has already been taken, so we will need some type of long or extension cable, which may impact elevator design.
- CDR will be Wednesday (December 17). Jim will schedule

DWSM

- No work since last week.

GUI Development

- Kevin has taught Roman M. how to download data, which he has done for the last triple-deployemnt.

Other Items:

- Discussed potential classes at JALA for Brent and Scott. Both will be going, with perhaps 2 science people. Must get logistics to Cindy by tomorrow.
- Chris has spoken to Grech about moving ship days and not looking good. Solution will be to move Feb and Aug orphan days to the Fall for another MARS hookup. Although no extended running time before Flyer cruise in June, his deemed acceptable. Dates now look like this:
 - - Dive 1: March 25--no core but elevator, DWSM, sphere
 - Dive 2: April 7-core in sphere, elevator, DWSM-run WCR
 - Dive 3: April 14-core in sphere, elevator, DWSM-minimal chemistry (SHA)
 - JUNE 8-12--Flyer cruise (these dates may be moved a few days earlier, depending on DMO scheduling changes)
 - AUG 16-26--Flyer to Axial
 - Dive 4: Fall #1 -plug into MARS (date depends on what we can get that first week)
 - Dive 5: Fall #2- pick up from MARS
 - Dive 6: Nov 4--plug into MARS, pickup in early 2010

11Sep2008

This page last changed on Sep 15, 2008 by [jbirch](#).

Schedule Items

- October deployment:
 - Using Shanna Rae; MOB on October 8 (Weds), deploy October 9 (Thurs)

Machine Builds

- AIV mounted into Moe
- Elbow still giving problems with sticktion. Cheri and Scott have spent 3 days working on it, yet it still needs 2x the current of the elbow on NEO. Much discussion of what may be the problem.
- Will do a quick can-test this afternoon of NEO with the MFB attached. Will build delrin stand-off to help guide core into can. Addie to talk to Mike P. about this.
- Dick has checked all Sleepy boards; now needs a host board. Brent will work with Wayne MONDAY to generate a host. Will get to Dick by TUESDAY. Meanwhile, Dick is moving on to testing dwarves.

MFB

- Addie to work on a mechanical solution to the loosening of the mixing stand-pipe. Will not use silicone.
- Will size-test in can this afternoon
- Must connect PCR-module to dwarf via serial cable. Brent has cables; Addie will get and handle config file changes to make it work.
- Delrin stand-offs; talk to Mike P about design.

Software

- Current versions:
 - **FIRMWARE**
 - 2 Dwarf 'flavors':
 - v 2.59--Standard on all dwarves (some dwarves on NEO have 2.58). ALL CORES WILL BE UPGRADED TO 2.59 before October deployment. All dwarves Dick is testing are being loaded with 2.59
 - v.2.5a(64Hz)--special version for MFB dwarf ('a' version has debugging feature removed)
 - **RUBY**
 - Mainline Ruby is on Bruce and Mack
 - A branch is called MFB/NEO--- this version modifies 3-4 files unique to NEO
 - **LINUX**
 - Mack & Bruce using v1.6---which has slight communications change from NEO. NEO will be upgraded to v1.6 so all running same LINUX.
- Also, a 2nd puck evac added to BAC arrays. Worry is that code is not tested. Chris S. will start testing on Bruce & Mack this weekend.
- Stitching of 'superphase' code will commence early next week (Monday).
- Wayne will work on getting up to speed on our board structure, and set-up a procedure to make board-burning more accessible to the layman.
- Wayne will work on getting firmware into HEX format so easily accesible to all.
- Tracking ESP Boards
 - Wayne asked what people wanted to track. He has good idea of variables and will work with technicians to build a MS-Access database to track board builds, and firmware changes on those boards, etc.
- All parts in for antenna installation tomorrow. Scott building a kit for Brent to reterminate cable. Meeting at Abol's house @ 1:00pm. Mounting bracket should be finished by 1 today.
- Tested radio system on Mack. Something wrong because data from buouys can't find the WWW on-ramp.. Brent will try and fix this PM; otherwise will work on after antenna installation.

DWSM

- Bell housings should be delivered to MBARI Tuesday.

- Oatmeal can is ~75% finished
- Sphere needed updated drawings--more detail for machining. Doug stopped them from welding holds on the hemisphere and provided ports to hold piece.
- Big purchases coming: Swagloc/Min-K/Electrical fittings
- Must talk about \$\$ and burn rates in ASTEP/NSF/MBARI
- Doug needs 7 valve-motor mounting parts. Will take from MFB stock, but must re-order/remake.
- Doug has been working on Solidworks assembly drawing for the *Oceanography* paper.

GUI Development

- Mission GUI. End of next week all compononets should be in mission script GUI.
- Mission state software very expensive, and licensing is labyrinthine.

Other Items:

- Photoshoot of MFB mounted on core will be Tuesday, Sept 23. May mount grill to GG, to minimize impact on team.

12Jun2008

This page last changed on Jun 12, 2008 by [jbirch](#).

Jim and Chris will be gone next 2-3 weeks.

Plans to be completed by week of June 30:

Tech Transfer

- Finish NEO temperature calibration then give to Science for exercising
- verify boards for MOE and mount/install
- start fluidic buildup
- waiting on several items (pressure sensor, various machining from El Camino)

MFB

- Finishing SCWRRP samples this week
- Yesterday laid out detailed decision-tree on future experiments
- Chris P. to make sure enough MM, P/P, template for uninterrupted runs for next 3 weeks
- Tony fed-ex'd PCR tubing yesterday. Arrived today.
- SPE heater elements had to be sent back to company for thermal-conductive adhesive, which they forgot to apply.

Software

- Communications w/ Bruce are intermittent. Should check buoy for kelp and/or position
- Mack showing large dB loss in its communication. Brent suggests we take off some of coiled cable in roof antenna to give us a few dB more signal.
- Brent to work with Roman to re-structure ESPshare for better file arrangement.
- A newer version of the 'notifier' software will queue both good and bad news and hold in queue until sent.

DWSM

- Doug will finish bell housing designs, have them reviewed internally, and send to El Camino for quote
- Finish designs of mag coupling pressure shrouds. We will manufacture here
- Finish design on swiss cheese plates
- order valves
- high-pressure motor should arrive next week

Other Items

- Chris S. has noticed that during this network deployment, images on Bruce consistently coming in dimmer than Mack, even though both have identical reagents. We believe images were the same before deployment. Scott thinks it could be due to differences in camera electronics due to the cold.
- CDR continuation: DWSM electronics and software CDR will be **Weds. July 9**. Invitations will be sent to Tom O., Mike Risi, Kevin G. Doug Au, Ed M., Chad K., Paul McGill.
- Scott still needs to do preliminary design of ROV mate-able interface and pressure board so plenty of work before CDR.
- Bruce/MACK recover is Monday, June 30.
- RE: newer chips. 35 of 52 dwarf boards will be populated with old controller chip, the remaining boards will have that position left empty should we decide to upgrade

Congratulations to everybody on a great deployment. We have three working instruments, two in the water for over 2 weeks, and much science data to chew on from this successful engineering effort.

This page last changed on Mar 19, 2008 by [jbirch](#).

ESP Engineering Mtg -- Mar 13, 2008

11:00 am MBARI: Birch, Scholin, Jensen, Roman

LLNL: Dzenitis, Bennett, Riot, Dean ; Tony absent

Teleconferences with LLNL

John feels MFB development has 3 stages:

1. Make right what we already have; this is in the original scope of work of what we want
2. Finalize some things before the last design
 - a. analog boards need final (correct) values
 - b. finalize the optics
 - c. some heater tubing does not slide in easily; fix heater element
 - d. minor changes in circuit board structure
 - e. incorporate better connectors
 - f. better machine heater cover package
3. How do we make many of them? This ranges from
 - a. LLN makes more of what they finalize
 - b. specialty shops do subcontract work--subassemblies go to MBARI or LLNL for final assembly and checkout
 - c. contract outside to make the blocks

LLNL wants out of the manufacturing loop. They are leaning toward

Subcontractors build subassemblies and we put together and test according to LLNL procedures. LLNL will put together the testing procedure.

Chris says we need 8 blocks.

During documentation of the assembly, if we assumed more active role in documentation of assembly and testing procedure, it would lower the cost.

John wonders if thermal profile is still rock-solid? We will get Addie to run one and provide ASAP.

He hopes to have SOW for additional work in 1 week.

13Nov2008

This page last changed on Nov 14, 2008 by [jbirch](#).

Present: Scott, Doug, Chris S., Kevin, Jim, Cheri, Brent, Wayne

Absent: Addie (SolidWorks training)

Machine Builds

- Scott wants to change power connectors on our 3 surface cans; current ones are starting to break. Total of \$4K. Yes, we will do--charging to 900612.
- Moe finished with pressure calibration. Fluid has been moved through the core. All that's left is temperature calibration (cold, room, hot) which should take 2 days.
- We must add '[light puck checkout](#)' to our checkout procedure to help understand camera variability.
- must change O-ring material--cracks discovered on Moe's o-rings, where no fluids have been run. Will go to Viton or Silicon.

MFB

- Writing schematic for MFB is turning out to be more difficult than first thought because of prior documentation. Scott working to fix the mess.
- MFB valve problem that stopped our dye testing yesterday turns out to be a wrong valve assignment. Unclear how assignment got changed, but Scott to track down.
- Jim will talk to Jose about having parts ready for Addie's McLane build. Jose gone the month of December, and we need 2 wiring harnesses, 2 voltage regulators, 1 I2C power board before he leaves.
- Question came up as to how close the grill is for naive user (Kendra) to start pushing fluids and do a basic checkout. Must call Addie.

Software

- Debugging on Neo is running, but so far no problems. It is running all contextual sensors, but one difference with deployment is that is running on the network, not locally. Reason for this was....
- Also, small change to the Ruby interpreter was installed that now releases dead stacks, so it doesn't try to chase any dead references. This may have fixed our problem.
- All NEO software will be merged back in the main trunk, which may cause problems for Bruce and Mack. Since these two are going to be run hard, Brent should check with Chris before this merger takes place.
- Scott has plan for using himself and Wayne to set-up a Dwarf Gateway in early December when Wayne returns from India.

DWSM

Sphere

- Spheres are finished at Tapemation (YEAH!!), and we will ship back to Wah Chang for dye testing. Dye testing =\$500 total. Unknown shipping costs.
- Titanium vs. SS sphere fasteners. We discussed; TI=\$1800, SS = \$200 but will need to be replaced. We will buy TI.
- Min-K's to arrive Dec. 15
- As soon as dye tests finished we will schedule a Port Hueneme pressure test.
- Syntactic foam to arrive by Jan 1-2nd. We will need to send foam out for machining.

DWSM

- Sample can is ready for valve actuators and motors+pumps.
- Resample can is still waiting mounting parts, but then just needs tubing bends; pumps already mounted
- 1st week of Dec is when we can start running it.
- Doug wants to purchase some extra motors since we have 0 (zero) extra's currently
- Doug will get r-valve boards and actuator mounts from Addie Monday or Tuesday next week.

GUI Development

- Data import now working in the GUI
- Now it is not necessary to parse through the log files . Still some minor bugs to work through, but Kevin will meet with Brent about this.

Other Items:

- Scott will run next week's meeting in Jim's absence.
- Scott wants to clean GG of all fluid so he can run a -5C test with EtOH to check the new 'cold' syringes. Scholin to confer with his team about cleaning GG.
- Will need to purchase 12 sets of batteries for elevator (~\$40K)
- WE MUST START THINKING ABOUT ORDERING MORE PUCKS for the NEW MACHINES.
- Ship Schedule: currently working of Revision 1. Much discussion about moving Aug6 day to sometime in April. We will finalize this move next week.

| | **Remember**

Please remember to use ESD straps in the bldg A lab, as most of its chairs and countertops have failed ESD testing. Dick Littlefield looking into seat- |

ESP Engineering Mtg -- Feb 14, 2008

11am-12

Present: Jim, Doug, Chris S., Addie, Scott, Brent, Cheri, Rich S., Kevin G.

LATEST Deployment Schedule is [HERE](#).

Tech Transfer

Discussion Items:

- Update on Mack progress
 - Have run into a hand homing issue. Replacement of everything, and movement of hand to another instrument has the issue following the hand. A new hand on Mack does not show this problem, but still unknown what is causing it. Otherwise, everything calibrated on Mack (hand, intake pressures, carousel).
 - Dynamic control of puck temperatures is good, but still only able to hold within 4 degrees of setpoint. Most likely because temp sensor doesn't touch puck all that well, or this touching varies; thus final goal temperature is off. Regardless, Brent thinks we are much better than the GG and Neo runs last year.
 - With the long weekend (Friday and Monday-Prez day) we will run non-stop mock missions through Mack (Flush, BAC, LARV, HAB, HAB-DA), before bagging on Tuesday and allowing science to run 'real' missions. Deployment schedule has changed (see above link).

Chris' plan for the long weekend mock:

```
Hi everyone -
target temps are ideally:
sh1 - 85C
DA - 70C
sh2 (laf, saf) - 30C
having said that, we might we drop the actual setting on the esp a couple degrees to remain on the
safer side of the line (hotter is worse). So Brent, use your judgement. I know a setting of e.g. 28 for
sh2 could be hard to hit when working in a warmish room, but worth a try?
The outline of the simple mission for the faux run is given below. All sample vols should be 50 ml
(sample for lysis and wcr). All reagent lines, including sample) will be filled with flush fluid. Exposures
should be 160s 1x1, 40s 2x2, auto 2x2. Should we #-out the auto exp since there should be no light,
or just let it burn till time-out for kicks?
# before starting run prime all reagent lines and make sure to purge intake so the sample line is
primed too.
romanFlush #not sure this syntax is correct - Ro pls verify
bac
larv
hab
habda
da
#end
this should be 22 pucks -- do you want to put them in a single stack or spread around?
```

- Mike Parker contacted about piezoprinter problems (holding down membrane, cutting out disks) and is designing solutions. Also will be approached about a puck holder.
- New syringes.
 - [Still not heard back from company](#)
- Screens and scintered frits

- Will order 400 10um frits with frit packing tool. total cost \$4300.00. Order placed 2-14-08. Here is the [order](#) and the [quote](#).
- We will order enough screens for 6 instruments. (who is doing this?)
- Puck Laser Etching
 - first half of pucks have returned from the etching, and SH1 tops and HV puck tops are mislabeled. Will investigate sending these back, as well as sending out the 2nd batch of lot2 pucks. The first 'new' batch (lot3) has arrived from El Camino, Mike P is inspecting. Has found they forgot to put hole in SAF bottoms. Will return to get that done. These pucks will go straight to etching before we get them.

Action Items

Action Items from last week:

ACTION: check with Jose about number of dwarves to order (Scott) **In progress:** Jose still working to assemble a more accurate list of electronics/machine for a more accurate cost estimate

ACTION: syringes. Wait to hear from company final costs and order #'s and get sample of their new product. (Scott) **In progress**

MFB

Discussion Items:

Decided to run thermal cycler all weekend with just water and bleach, to see if extra 'seasoning' of the tubing will lessen its inhibition of the PCR reaction. Upon return next week, will run sample to test PCR effectiveness.

ACTION: Addie to look at heating profile times to make sure we are not cooking our reaction. (Addie) **Finished**

Software

- puck heating control
 - Brent has gotten calibration w/in 4degrees, but measuring puck temp is problematic.
- Firmware 'lock-down'?
 - Thermal boards and Dwarf boards look fine, but the failing home sensor in the hand seems to generate a cascade of failures. This will be fixed.(Brent)
 - GG and Neo will have old firmware and old Ruby. Mack will use newer of each and these versions need to be kept separate.

Sphere and 4K DWSMS

- Sphere update
 - No word or update from Wah Chang.
- DWSM progress?
 - Doug believes he's found a pump that will push reliable, reproducible amounts of fluid. Ordering motor to run it, and now must test that it pushes the correct volumes of fluids with no back-flow.
- Battery boxes? Will order 1 box (~\$2200; acct 701312.04; Scott)

ACTION: Have BATTERIES been ordered? (Jose)

ACTION: Change cracked power connector on GG's lid (Cheri)

GUI Development

- Mission script GUI introduction

Kevin has placed new GUI on the server here. Rich Schramm available to do data parsing work; we want to utilize this by Sept deployment.

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem
Chris P. and Brent need to address high volume issues for Sept deployment.

Deployment Update

- All three instrument working well. Problem with Neo's radio was that it was running on low power. Trip to mooring allowed this to change. Santa Cruz radio link was spotty; Brent thinks that the mooring is 100 yards too far east forcing signal to traverse lots of land. A minor tweak of his roof antenna has made transfer speeds acceptable.
- Neo has had 1 error; elevator retry while moving pucks; doesn't look serious.
- Message rules need to be reviewed; phone emails of bad news are not getting sent. Scott and Brent to work on this.

Machine Builds

- MOE: temperature mounts made and now on
- elbow and harmonic drive still problematic. Many hours by many people spent to get drive aligned but no luck. Going to plan B:
 - order 2-axle (pre-aligned) harmonic drive and redesign mount on arm
 - use GG's arm to finish build and calibrating of Moe. Cheri estimates 2 weeks and it will be ready to hand to science.
- Cheri working on BOM for the two ASTEP II instruments to be built in 2009.
- El Camino has delivered a small number of parts for the next two units

MFB

- Parts list for 3 ASTEP II MFB's and remaining parts for current 7 MFB's will be finished early next week. Plan is to send jobs to a Santa Cruz shop since El Camino is overbooked.

Software

- Starlight Xpress, our camera manufacturer can still get old USB boards, but upon recalculation, we may not need them for 2009. Currently we have 4 USB 1.1 cameras: Doucette, Scholin lab, spare, and GG's. We could purchase and trade 2 newer cameras for Doucette and Scholin lab, and have 4 older cameras available. Would still like a price for Starlight to make the old ones, but now no rush.
- Brent arranged a visit from a board manufacturer with ties to LabView. Invited interested parties.
- **DWARF ISSUES:**
 - Wayne has found you can take a good board, but when trying to clone bits from it, we can't identify the processor. Much discussion on why this may be; perhaps blown fuse?
 - Writing of Dwarf Novella; **Brent & Wayne to meet Monday 2-4pm** to discuss this.
 - Wayne building a Verilog motion-control test bench for Scott.
 - Cloning of Bufflehead: **Friday, 1:00pm start of clone.**

DWSM

Sphere

Doug made Tapemation visit on Tuesday:

- - Sphere bottom looks good. Lathing finished, now onto mill; should be finished ~ 2 weeks.
 - Top still an issue. Doug re-did drawings to try and adjust to the poor casting. Top will need minor machining (lift points, and thru-holes to connect to bottom)
 - Pictures of these are in project Library. Check out [/projectlibrary/ESP/DWSM/4k DWSM/4k Sphere Pictures/4k Sphere machining](#)

DWSM

- Will be built in Bldg. B lab
- Must build a test-rig for filtering oil
- Bulkhead plates (swiss cheese) have finished face-machining. Now doing sides of plates. Looks like Ray will finish before he goes on vacation.

- Doug ready for Dwarf/host/sleepy combo to start testing subassemblies.
- Syntactic foam to arrive in January. Currently enough foam for 12 batteries, which is out contingent weight (if stuff is heavier than calculated, we will have to remove some batteries, lessening deployment time.)
- Preliminary elevator idea has been vetted with Lobos crew. Preliminary dimensions and weights will work.

GUI Development

Other Items:

17Apr2008

This page last changed on Apr 17, 2008 by [pargett](#).

Attend: Everlove, Harris, Jensen, Roman, Pargett

We met and Scott took notes since I couldn't get into the Wiki until just now.

ESP Engineering Mtg -- Jan 17, 2008

11am-12

Present: Jim, Doug, Addie, Scott, Cheri, Brent, Kevin

Tech Transfer

Discussion Items:

- Arm status update
- Environmental test chamber update

Arm/Hand. Removed Bruce from cold testing, and *almost* finished with hand cold testing. Removed hand from Bruce and installed on Mack. Plan is to finish cold-test on hand and cold-test valves simultaneously on Mack. First priority in cold is to finish testing hand gripper. Once it passes, Mike will get green-light parts of the other hands (first 3 old action items). Order is placed with Maxxon for new forearm motors (maybe 6-8 weeks). Small order of fluidic fittings still needed for all of them. (Cheri)

ETC (Environmental Test Chamber). Cold box finished, electrical connectors in, fluidic connectors still need to be put in. New rotary valves all on Mack and being homed and calibrated. All we be ready for cold testing by end of day.

Action Items

ACTION: Order fluidic fittings for cores and MFB (Cheri)

Action Items from last week:

ACTION: check with Jose about number of dwarves to order (Scott) **In progress:** Jose has mad the first pass through and looks like all components are still available. Jose getting price and lead time on everything.

ACTION: meet with Mike Parker to discuss the cam assembly and redesign of the cam motor mount. Decide about the assembly (Scott) **In progress**

ACTION: Will rev the drawing and have El Camino make enough to retrofit all hands (Doug) **In progress**

ACTION: Will drill out pressure sensor holes in clamps when we revalve the cores. (Scott/Cheri) **In progress**

ACTION: cannot purchase on 708 grant yet. 701312.04 should take all cost. Change: Order only 2 cans (Jim): **DONE; ordered 1-11-08**

ACTION: talk to Jose to figure a solution to broken home sensor cable. (Scott/Doug/Cheri) **DONE**

ACTION: Contact MAXON about forearm motors (Cheri) **DONE: ordered 1-14-08**

ACTION: confirm we have 3 swappable EM cables (Jim) **DONE: confer w/group and decide 1 spare is enough**

MFB

Discussion Items:

- Syringe positioning

Syringe now oriented like other syringes on the core, i.e., pointing 'downward', and working well. Still waiting to test as several cables needed to be lengthened.

- Status of mixing column for extraction lysate.

Unable to build a 10cm mixing column because the use of 2 reducing unions requires a minimum of 50cm of tubing. Thus, mixing column is now 5x as long as it needs to be but waiting for Chris P. to do testing. Hope to test column next week around LLNL PCR vesity.

ACTION: Jose to lengthen motor control cables (Addie).
ACTION: syringe motor mount. Mount 'upsidedown' for better lubrication. Changing motor for better gearing/speed ratio. (Addie) **DONE**
ACTION: confirm with email to Tony (Jim): **DONE**

Software

Much discussion on how the code will be modified to accommodate a new thermal profile for puck heating. Brent suggested a very thorough plan of action, but was forced to accept a less elegant solution. Scott will provide nominal offsets and Brent will put in a mechanism to set gain/offset before every heating cycle. He has agreed to do this before the can cold-testing. (Brent)

Pressure tests; did four pressures. Chris P tried to grow lysate, but ran out of a reagent. We like 20-25psi---it's pumping like GG was. This number easy to change. He's made several parameters changeable. Chris P. knows most. Brent will create cheat-sheet for how these changes.

Firmware: servo-control works very well on MFB. Sampling at 64hz. this is different from all other dwarves so what should be do? Old code cannot change the divisor in the dwarves, but new Ruby can actually change the divisor, thus sampling at different rates. These are relatively large firmware modifications, so we will implement when the MFB goes in, NOT for Spring deployments.

Several small changes have resulted in a new firmware version that we should update on Mack, Bruce, Neo. Brent will send email to everyone explaining changes.

Action Items:

ACTION: Put in mechanism for setting gain/offset before heating cycles (Brent)
ACTION: Write 'cheat sheet' showing new parameter available for changing during sample collection (Brent)
ACTION: Update firmware on Mack, Bruce, Neo with the 'slightly modified version, and email the changes within this new firmware to everyone (Brent)

Action Items from last week:

ACTION: Set-up sleepy board and an elmo on desk to emulate (Brent) **In progress**: Can't find elmo but have other pieces.
ACTION: working on a cue of interrupts in the threading environment--[low priority] (Brent): **Not started**
ACTION: Work with the auto-cal code (Brent): **Not started**
ACTION: Speak with Wayne about his timeline with BIOSA and his ability to commit to low-power studies for us. (Jim): **In progress**
ACTION: Test pressure stuff (above); if problems, then heating stuff is dropped. **DONE (we believe 20-25psi delta will work like GG)**
ACTION: Chris to give Brent water sample for running next week. Test running on bench at various pressures and run lysate test to test effects of different pressures (Chris/Brent) **DONE**

Sphere and 4K DWSMS

Oil for DWSM has arrived and currently being cold-tested. Doug met with local micro-pump rep, and is getting close to choosing the pumps he wants. All parts are ordered for the plastic model, which he will build in the Bldg B lab. He has the layout design and partial design for vavle actuators.

Nilo has inventoried all pucks and is receiving instruction on how to get them laser-etched. Will take first batch for etching next week. Following this [numbering scheme](#).

ACTION: get inventory of screens from Roman (Jim): Must spec hole size and fix original drawings and talk to manufacturer before ordering. **In progress**
ACTION: Order two battery boxes (w/out batteries)--~\$4K; account #701312.04: **In progress**: Scott waiting for lower price
ACTION: Get quote for surface cans from Gene and place order (Jim): **DONE**
ACTION: discuss procurement and build schedule for next 2 cores (WHOI and CMORE funded) at 1-24-2008 mtg (in two weeks) **next meeting**.

GUI Development

Kevin trying to have the Mission Script GUI in our hands before the [cold box testing](#).

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor. ACTION: how will BIOSA integrate and drivers needed (Brent & Wayne)

17Jul2008

This page last changed on Jul 22, 2008 by [jbirch](#).

Doug will be on vacation July 14-July 28.
Scott will be on vacation July 16-July 22.

present: Chris S, Addie, Cheri, Brent, Jim

Instrument Builds

- Decision to make NEO the PCR machine, as Moe will not be ready in time. Cheri is working on converting Moe to make it PCR-enabled.
- **Must remember that Mack and Bruce are still using back-side puck temp sensors. Neo has been changed to front, as should these two eventually.**

MFB

- Brent commented that much code has been checked in, but not OUT, so still lots of integration needed.
- Changing the SPE column has successfully knocked down the signal on the negative runs.
- Addie continues to build the grill; waiting on ball screw and syringe pieces from Mike
- Check valves have arrived. Idea is to reduced back-flow from pressure difference flows; this may be a big change in scripts and build, so tabling this change now.

Software

- New firmware is working, but still needs minor amount of testing. Intended to install on Moe (w/ PCR), but now decision is NO FIRMWARE changes until DWSM comes online.
- Brent looking into 2 ESP's at M0 w/ only 1 shore radio.
- GUI Development
 - need to assess 2009 needs
 - Will mt with Kevin, Rich Schramm, Jim B, Chris S., Brent
- Scoping of S. Cal Piers still in planning stage.

Other Items

- Chris S. asked about building a 3rd surface mooring. Will talk to Mark Brown. Idea is to have 2 machines at M0, 1 at Santa Cruz. Jim looked into this and it is possible. Jim Scholfield will work on starting July 22.
- McLane visits next week (Wed/Thurs). Weds will be tech discussion, Thursday will be business discussion.
- SFWD rep (Mike Casteel) visits today to discuss collaboration of ESP in SF municipal water monitoring.

18Dec2008

This page last changed on Dec 29, 2008 by [jbirch](#).

No notes from this meeting.

Deployment Update

- October deployment:

Using Shanna Rae; MOB on October 8 (Weds), deploy October 9 (Thurs)

- Mission is defined for NEO. Still to do for Mack and Bruce but should be straightforward
- Small Array format being difficult. Will make call by end of day today on whether we can make it work; we're very close, but may punt on it.
- If it works, need Brent to work on software integration. He may work on it over weekend.

Machine Builds

- Moe--elbow still not working. Scott conferring with engineers within company. Mike working on putting counter-bore into holder piece which may help alignment.
- Moe should be ready by Oct 13 visitors.
- Bumper for NEO ready
- Board checkout--Dick got host board. We need some dwarfs so Cheri/Addie may quickly check 2 out. Cheri will show Wayne how checkout works, tomorrow.

MFB

- Much discussion of stand-pipe issue. Decision was to not change what works, since it hasn't loosened since people have stopped messin' with it.
- Brent fixed a problem with the serial cable from the PCR module to the dwarf; power cycling is no longer a problem
- Have had 2 time-out errors with the AS; it loses its position but dwarf is not reset. Brent will try upgrading firmware from v.2.50a(64Hz) to v.2.59a(64Hz). If this doesn't work, we'll try a new dwarf.
- Bruce 'brain-freeze' may have been a network problem. Brent changed from CAT 3 to CAT 5 cable in the B-lab. Still watching for hangups.
- Addie contacting PCR-tubing company for a remake; in meantime we will NOT be asking LLNL for more tubing, as it appears the current tubing works.

Software

- Would like to freeze Mack/Bruce code by tomorrow (Friday). Start radio tests next week. Must exercise all assays to check out.
- Many chunks to stitch together for SAF to work on NEO. Much discussion on how long that may take and how much cutting into our cold testing is acceptable. Chris working with roman and brent on this.
- should re-name 'home syringe' on MFB (Addie). Discussion finalized a solution.
- Brent discovered they don't make the old CTD's anymore and there is question as to whether our drivers will work with the new CTD model. Decision is to use old CTD's on Mack and Bruce. We then can 1) borrow another older model, 2) use the deep CTD (with wacky pressure gauge), or 3) get a new one and hope drivers work.
- Brent working on firmware today and will hand-off HEX files to Wayne

DWSM

- Drawings for both plates finished and gone over with Ray
- Estimate is that Ray will be working on these until October 23
- Oatmeal can is now called the Thermos, and is finished
- Bell housings are here and check-out.
- Burn-rates on ASTEP and NSF are acceptable; if we need more shop labor time, Chris S. can charge less to grant.
- there is one piece of pressure testing for DWSM that is \$6K. Approval given to purchase.

GUI Development

- Kevin out sick today, but stated the following in an email: Jim, the ESP GUI should be ready for the mission planning exercise tomorrow and I will work to finish it up today and roll it out to production tomorrow AM. I can then work with Chris P (or whomever) to do the mission plan. I have started on the data access part and am hoping to have something working over the next couple of weeks before the deployment ...

Other Items:

- *Oceanography* paper came in 6 pages over length limit, so we are not including photo of MFB mounted to core. Photo-shoot next week is canceled. Chris is editing down...
- Research on renting a storage van has begun.
- The heavily load in support engineering was explained to the ESP team. Mark would love 30-days advance warning as many disparate projects have come due in Q4 and Q1, 2009.

20Mar2008

This page last changed on Mar 21, 2008 by [jbirch](#).

Present: Birch, Everlove, Jensen, Pargett, Harris, Roman, Gomes

Tech Transfer

Cheri update on Bruce. Needs to install hand before moving on. Brent would like access to work on race-ramming routine. He will finish Friday; Cheri gets Bruce Monday.

Mack running smoothly. Will run HAB/DA tomorrow (Friday) and continue box mission

MFB

Unable to duplicate the positive amplification we got last week for the Moore report. Addie to check the thermal profile.

Software

Brent has a variety of software issues to work on, but most effort is focused on keeping Mack running smoothly

Sphere and 4K DWSMS

Pumps continue to arrive. Two additional surface cans have various manufacturing defects. Doug working with Mike Parker to determine which pieces get sent back.

GUI Development

Not discussed

Deployment issues discussed. We have asked and been granted permission to stage ESP in Bldg D. Discussion ensued about our reputation before and after deployments, and whether we should have a dedicated support person to help pre and post-deployment activities proceed smoothly. We will ask Mark B. if Jim Scholfield might be that person. Must check with Chris S. about having resources to use him.

This page last changed on Nov 26, 2008 by [jbirch](#).

Scott ran this meeting.

DWSM

Design review for Elevator - We will be holding an Email PDR followed by a CDR

Sphere status - It is in Oregon at Wah Chang

Construction update - Progressing with 1/2 of the tubes in, Sample done with rotary actuators.

Actuators need calibration

Encoder and Xilinx - Old working code breaks with new Xilinx compiler 10.2. Wayne is going to try using an evaluation license of a different compiler to see if similar results are obtained.

MFB

Schematic progress - Jose started but was stopped by Brent stating things were going to change. Chris S. noted that the AIV is not placed as it will be when integrated to the core. The AIV needs to be added to the standalone system. We will use existing core harness to make the MFB until we have finalized the shape and location of the MFB. As far as the electrical harness are concerned, the schematics are complete we just need to add lengths to them once they are determined.

MFB needs a written engineering checkout procedure.

Single connector - Was done the above mentioned issue has cause for change. I am trying to move towards a Stand-Alone support box which continues to support the notion of single connector switching. This means that the host, gateway and I2C power supply may be removed from the MFB Grill.

AIV to Grill

ASV air port still is leaking we need to come up with a solution. This port needs to hold at least 200uL and be cleanable as well as vent to a clean air source.

Software

NEO test run update - the changes seemed to have worked as there were no failures. Memory consumption was down due to restructuring of the Ruby "eval" routine.

Science - Light puck comparisons between NEO, MaCK and, Bruce; and then figure out why different.

HV puck - ESP needs to resurrect the HV path as a research project. Some issues are: How to seal sides, long term reusability and, what ever else crops up fro this work.

Pucks - In all our puck orders we never order the HV pucks. We need to order some so that we can start this works. This should be done in conjunction with ordering more complete sets from MOE.

MOE - Temperature calibration done as well as pressure.

O-rings- Doug ordered Silicone and Viton O-rings. Viton are 75 durometer which is most likely to hard and Viton does not work well with Ethanol and Methanol. Silicone is not the best for the alcohols but usable. Roman will be immersing the two types into some of the fluids used to check compatibility that way.

MaCK and Bruce are ready to move

We need a place to store the Orange Cart as it is not needed to hold an instrument and takes up building b lab space.

Next build, possible two in the spring.

Wayne has Hosts in his office, if you need one feel free to take but, do not feel free to not send an email. Please send Wayne and Dick an email letting them know you have removed one and where it will be used so that we may track them.

Schedule Items

- Middle of September; Japanese visitor to work on MFB.
- End of Sept for ~3 months; Allison Haywood (New Zealand) to work on a core.
- October deployment:
 - Using Shanna Rae; MOB on October 8 (Weds), deploy October 9 (Thurs).
 - there are enough ISUS's for deployment; must test all.

Machine Builds

- Gripper boards are out for fabrication
- Puck sensor boards (10 made) have been modified and [Scott](#) is testing on GG in the fridge. Preliminary results look good at ambient (+/- 1 degree difference from ambient; off 3 degrees at 5d C).
- Mack and Bruce being used (today) by SC group. Should be ready for October deployment with a simple reagent refill.
- Boards:
 - 50 Dwarf / 10 Sleepy / 50 R-valve boards are in. Each needs a QC checkout which [Dick](#) started on 20Aug2008.
- Much discussion on the number of boards and the NEXT round of builds; could/should we do a board/camera redesign?
- Wiring harnesses are in and QC'd. Many assembled into their 'super-harnesses'.
- Still waiting on small machine parts from El Camino
- Installation of tubing on Moe is next; **should take 1 week**. Still need to mount AIV on Moe, which was originally scavenged for Neo. [Cheri](#) predicts **3-4 weeks** before Science gets Moe for check-out.
- [Cheri](#) will get Mike going on the small hand pieces for Moe's manipulator.

Rough calculations on Mooring Cost:

Materials/Radios/machined parts/cables/bungee/all parts == \$50K + 2 mo's labor

MFB

- Grill is working! as are PCR scripts
- SPE script is close but syringe continues to have trajectory errors. Much discussion on how to address. Decision to run overnight to 'break-in' and see if sticktion issues are still a problem at slow speeds tomorrow. If that doesn't fix it, we can either gear down motor (but this has problems; fast moves would be slow, mechanical advantage makes it more likely to break something if valve gets stuck), or find a more compatible plunger/barrel combination.
- Stand-alone power boards not yet begun ([Scott](#)).
- Go/no-go on PCR for October deployment depends on how PCR does in cold.
- Mechanical changes for NEO to accomodate grill are finished, but scripts need testing. PCR/core group will meet today at 2:00pm to discuss integration.

Software

- Antenna at Novin's (Sunset Dr, Watsonville). [Brent](#) and [Wayne](#) going out today to scout and sign agreement w/ homeowner.
- DWSM code
 - starting to test limit-switches; development of this code is on-going
 - DWSM code is to a state where we could start testing if we had an instrument.
- [Brent](#) mentioned that if the new puck thermal-sensor is super-accurate, then maybe no calibration is needed (the preferred method). Perhaps insulating sensor may add to it's stability/accuracy.
- [Brent](#) fixed a core bug. The handling of background threads by using the 'stop' command now works.

DWSM

- **Doug** spoke with El Camino regarding DWSM parts. Bell housing should finish this week, anodized next week.
- No DMO discussion yet on weight balance/elevator design
- Min-Cons **to be ordered** by **Scott**; may take awhile because made of titanium (or 'ti-dized')
- Pressure testing; Initially, we do NOT need to go to 4Km, thus we will send/take sphere to Port Hueneme for testing.

NEXT WEEK:

Bring Calendar for deployment planning

Must test new syringes that arrived yesterday

ESP Engineering Mtg -- Feb 21, 2008

11am-12

Present: Jim, Doug, Chris S., Addie, Cheri, Kevin G.

LATEST Deployment Schedule is [HERE](#).

Tech Transfer

Discussion Items:

- Update on Mack progress
 - Cheri noticed on Tuesday (19th) that the compression bolts are not gripping the motor shafts tightly enough. This stopped all preparation for the mock-mission run, and demanded a re-design of the valve/motor connection, which Doug helped brainstorm and propose a solution. 2mm balls are required for the fix, and, after calling every ball bearing place in 3 counties, we had to rely on MacMaster (delivered today).
- Mike Parker contacted about piezoprinter problems (holding down membrane, cutting out disks) and is designing solutions. Also will be approached about a puck holder.
- New syringes.
 - Still not heard back from company
- Screens and scintered frits
 - CE metalurgical will create a 'stamp' to label the frits. Cost is \$300/tool. Will label at 1/2radius on one side of frit.
- Puck Laser Etching
 - Mike put in SAF bottom holes, but got confirmation from El Camino on remaining pucks to not forget that again. Remaining pucks from first batch ready for etching. Then to send out lot3 for etching. Have spoken to Roman and Nilo about this.

MFB

Discussion Items:

After seasoning the tube, gels show that we are getting product produced (using calf thymus). Addie will begin work for the Moore year-end report.

Software

- puck heating control
 - Brent has gotten calibration w/in 4degrees, but measuring puck temp is problematic.
- Firmware 'lock-down'?
 - Thermal boards and Dwarf boards look fine, but the failing home sensor in the hand seems to generate a cascade of failures. This will be fixed.(Brent)
 - GG and Neo will have old firmware and old Ruby. Mack will use newer of each and these versions need to be kept separate.

Sphere and 4K DWSMS

- Sphere update
 - No word or update from Wah Chang.
- DWSM progress?

- Doug believes he's found a pump that will push reliable, reproducible amounts of fluid. Ordering motor to run it, and now must test that it pushes the correct volumes of fluids with no back-flow.
- Battery boxes? Will order 1 box (~\$2200; acct 701312.04; Scott)

ACTION: Have BATTERIES been ordered? (Jose)

ACTION: Change cracked power connector on GG's lid (Cheri)

GUI Development

- Mission script GUI introduction

Kevin has placed new GUI on the server here. Rich Schramm available to do data parsing work; we want to utilize this by Sept deployment.

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

22May2008

This page last changed on May 22, 2008 by [jbirch](#).

Discussion Topics:

-Upcoming May 27-28 deployment

Decision: Will set out 2 instruments. Mack, and a turned-around Bruce.
Plan:

Tuesday AM: Boat team--Scott, Doug, Chris S.

Tuesday PM: Bruce refurbish team- Roman, Nilo, Chris P, Doug

Weds AM: Boat team--Scott, Jim, Doug

-Personnel Vacations

Preliminary vacation plans discussed

-Board Bullets

Team asked for pertinent self-promoting items to present to Board.

Tech Transfer

- Lube on ball-screws--grease chosen and all will be lubed from now on
- Radio-modem box leakage--Scott to work on leaking Bruce radio box once mooring is in on Tuesday
- Status of 2nd mooring--not finished, but Scott working on today
- NEO heaters not starting unless power-cycled--issue to keep an eye on. Unclear what is causing it; possible static discharge on dwarf
- Mack hand slippage update--it's been tightened and run in the cold. No slippage. Not an ideal fix, but we don't know what went wrong initially
- Al vs. SS. on valve coupling--[Aluminum](#) is the chosen material for valve coupling

MFB

- First successful amplification occurred yesterday with a slug pulled into top of PCR module line. Addie cleaned ATV and input line #13, drew premixed slug into PCR through these; failed. Deconned and repeated yesterday's experiment. Results not [good](#).
- Encoders. Box of extra encoders cannot be found. Cheri put in order for PO # 0810834 to Measurement Specialties for 100 encoders -- placed on 4/24/08

Software

- How to avoid vapor lock on first sample after canning the ESP?--Solution decided was to fill line with fluid, then pull vacuum using a syringe to draw bubble back out intake line. Will try tuesday when canning Mack.
- procedures for uploading images from the buoy--Brent implored the use of the 'upload' command rather than pull images directly off the buoy. Otherwise, one must wait for the hourly update of images on ESPSHORE.
- Logging and displaying processed ISUS data

DWSM

- schedule CDR--set for **Tuesday, JUNE 10th.**

GUI development

Kevin out of town, but provided this message:

I will be returning from an OOI meeting today so I won't make the meeting. There aren't any GUI updates, but I know I have to change the GUI to output missions scripts in the new format that Brent has specified. I am shooting to have that done next week.

Other Items

- Planning for 2009 proposal

May 22 Discuss the plan for the next 4 weeks RE: 2009 proposal

May 30 Note this meeting is MOVED one day, to FRIDAY, due to the Ocean Sciences Meeting. Have 'nailed' our projections for 2008.

June 5 Have 'nailed' our 2009 projections

June 12 Have abstract ready (due July 1). Chris will be gone June 14-July 9? . I'll be gone June 13-June 29.

Deployment Update

- Deployment pick-up will be Monday, Oct 27. Roman M., Scott, Jim, w/ divers Kim R, and Lonny. Meet at MBARI @ 5:30am, lv for SC 6:00am. Should be back around 2:00pm.
- Machines/moorings will be unloaded in high-bay. Have permission to store there until Friday until we find final resting places.

Machine Builds

- MOE: BOM will be finished by end of today.
- GG's hand is now in Moe. It's sticking in some positions. Will remove, clean, and lube. If we re-use, we'll use GG's gains...
- After a 3 day 'break-in' period of the problematic harmonic drive, it is now drawing near correct current levels, so we may try to reinstall in Moe.

MFB

- Voltage-regulator boards: Addie needs 9, Cheri needs 3; we are having Jose order parts for 12 Voltage Reg Boards and 15 power boards. Boards will need to be spun but time factor is the same as if we did them in house.
- Wiring schematic of MFB: Addie will make sketch and handoff to Jose/Scott for official ORCAD schematic.
- Serial Cable to PCR module; currently 2 kinds depending on if its a stand-alone MFB (plugging into MFB host) or mounted on core (plugging into Sleepy). Idea will be to make 1 connector that will work in any situation. Addie/Brent/Scott will work on setting this up.
- Brent thinks we could use 4 more 64mb Host boards. Addie will order.

Software

- 10 host boards checked-out, but still need ribbon cables. Addie will order after getting specs from Brent.
- Bufflehead clone is complete and now called Tern (which is Jason's old machine; size about 40GB). Bufflehead will eventually move to Wayne' office.
- running a superphase (BAC and PCR together) shows there are threading issues in the current (old) Ruby. Solutions:
 1. Keep fixing this version of Ruby (v1.68), as it's small and has evolved with the current machines
 2. Take the most reliable version today (v1.86; working on v1.9), put in our patches and test-- could be 3 weeks work.
- Decided to run NEO in debugging mode when it returns and track down the superphase threading problem. If it's always in the same place then we fix and go with solution #1; if it's always in a different place, we discuss solution #2.

DWSM

Sphere pictures in [/projectlibrary/ESP/DWSM/4k DWSM/4k Sphere Pictures/4k Sphere machining](#)

- Top 1/2 of sphere; was not able to do complete clean-up cutting. Doug will check when it comes off lathe. Bottom 1/2 is now off lathe and on the mill. Both should be ready in 2-3 weeks.
- Doug working specifics of o-rings--could be \$15/each.
- Brent suggests we use current dwarves/software because DWSM not ready for full-blown new stuff.
- Addie adding some motor mount pieces to the current machining order that Doug will need.
- Mark Brown notified that we need to get on Port Hueneme schedule.

GUI Development

Other Items:

24Apr2008

This page last changed on Apr 24, 2008 by [jbirch](#).

Present: Birch, Everlove, Jensen, Pargett, Harris, Roman, Gomes
Absent: Scholin

Tech Transfer

- Cheri has started putting orders in for CMORE core we're building
- MACK doing first post-rebagging runs. QCing reagents today. If good, we'll load with pucks
- BRUCE: will start today with qualifying assay runs. Going in cold **MAY 5**. Will use GG's lid.
- NEO: has all new valves. Positioning needs verification.
- hand needs finishing, swapping, and calibration
- Neo goes in cold room **MAY 12**. Will use new lid.

Deployment

- Bail is being modified with weld so divers don't need to strap it on launch/recovery
- ISUS needs refurbishing-has been left with Luke who will do it early next week
- Monday Scott to work with Jose to refurbish battery pack (will be using a new one); for the 19 day deployment we used ~1/2 the battery pack. Probably get 6 weeks from full pack.
- Mike notified about diver needs
- Zephyr on Thursday @ 7am, leave @ 8am. Deployment team still to be determined.

MFB

- New block from LLNL arrived this week. Several scripting changes have been implemented which have helped stop killing our probe label. We have run slugs on old and new blocks, and gotten very nice endpoint results. Gels still to be run.
- Backgrounds on the two optical channels still are high (with water, 1630-1700 depending on channel).
- Need to find new heater vendor; Addie working on this
- Solid Phase extraction columns. Order approved, but building it becoming a problem. Addie trying to track down our original manufacturer.
- Must check with Mike Parker to see how his tombstone design on Moe is coming along.

Software

- NEO - firmware and Linux host needs updating
- MACK - needs Ruby with email notification. Brent will change and then exercise it through some mini-missions

Sphere and 4K DWSMS

*Must pull together a deployment plan for the Lobos and DWSM as there are still big holes in the DWSM plan.

- Mtg scheduled for April 30.
- Scott has gotten one of the brushed motors to work off the dwarf (GOOD NEWS) so we can drive high power things directly from dwarfs. Discussion to these benefits/logistics to be taken offline.

GUI Development

- The deployment GUI has been used for two deployments, and Kevin continues to get feedback and tweak it with each subsequent deployment.

ESP Engineering Mtg -- Jan 24, 2008

11am-12

Present: Jim, Doug, Scott, Addie, Kevin, Brent, Chris S.

Tech Transfer

Discussion Items:

- Results of hand/arm testing. [Hasn't shuffled pucks yet. Almost finished testing](#)
- Update on valve cold-testing of MACK. [Still to begin](#)
- Jan 15-29 both Bruce & Neo to be re-valved. Progress? [Not begun yet](#)
- New hand order. Plans update? Mike ready to go to El Camino? How many? [Not ready until cold-testing finished](#)
- New syringe cost. Acct to charge? [50 syringes ~\\$10K charge to 900612. May start to identify people that want these new syringes \(Chris S.\)](#)
- New Dwarf Boards. ~\$4K/system with 6 week lead time. Account? How many? [Just a core, but all electronics \(no MFB\), Jose should charge 900612 \(look to see if he has time \(Jim\) maybe a subaccount \(.99 for CIP\)\).](#)
- Mock deployment schedule and Spring field trials
- PROCUREMENT AND BUILD SCHEDULE FOR NEXT 2 CORES (WHOI & CMORE)

Two Options for build of two more cores:

Buy parts under another grant and then transfer charges to WHOI grant when money comes in in August 2008. This is dangerous as WHOI may not get money and if we've bought ahead, we'd be stuck with parts, and have hit another grant very hard.

CMORE machine will initially be stationed here at MBARI but eventually goes to CMORE partner. The best plan is to use BRUCE/MACK as the WHOI & CMORE machines, and have parts for their replacements on hand.

Chris thinks--do we know what we need to order. Get all ready to cut and look to mid-summer for procurement and build starting in Sept. By that time more money comes through and we could add to the purchases. This applies to all Jose's boards except the MFB boards. Now we should order enough dwarfs for MFB and spares. For MFB boards split between 701312 and 800560. Make sure subaccount charges are correct. The summer order would be the rest and the long-lead orders.

Second MFB is parted and here. Chris and Jim will work with grants to make sure money is spent correctly (reallocate MOORE monies).

Neo has been capitalized so buying any more parts goes to a different account (maintenance or equipment supplies, not the NEO CIP account).

[Q1-Q2 2008](#) schedule has slipped. Must shift our schedule back one month. Maybe can shave mock-deployment by running harder/faster.

ACTION: Will cast a new schedule taking into account our current progress (Jim/Cheri/Scott)

Action Items

ACTION: Order fluidic fittings for cores and MFB (Cheri) [In progress](#):

Action Items from last week:

ACTION: check with Jose about number of dwarves to order (Scott) [In progress](#): Jose has mad the first pass through and looks like all components are still available. Jose getting price and lead time on everything.

ACTION: meet with Mike Parker to discuss the cam assembly and redesign of the cam motor mount. Decide about the assembly (Scott) [In progress](#)

ACTION: Will rev the drawing and have El Camino make enough to retrofit all hands (Doug) [In progress](#)

ACTION: Will drill out pressure sensor holes in clamps when we revalve the cores. (Scott/Cheri) **In progress**

MFB

Discussion Items:

- Motor control cables lengthened? **Finished**

problem in cable that goes to 3-way valve. Jose can't figure it out.

ACTION: Will work on figuring cable problem. (Addie)

- Heater block re-plumbed? Owner's manual written detailing new drivers?
- Begin PCR tests?.

LLNL commands are now in Ruby (via Bob Herlien) and Addie has placed on Confluence a '[users manual](#)' for the PCR module. Software works well and easy to write scripts.

Fan not working on PCR module and Addie will try and track down why (check in various terminal/call LLNL) bob said he's never had the fan turn on or off with that module. (Addie)

ACTION: write Tony at LLNL for advice. **FINISHED**

Mike will bore out stator on the mixing column so we don't need more mix tubing or reducing fittings. (Addie)

Software

- Gain/offset for heating cycles installed? Still trying to test
- Has 'Cheat Sheet' for new sample collection parameters been distributed? (Not done)
- Firmware updated on Mack, Bruck & Neo? still testing

Action Items:

ACTION: Put in mechanism for setting gain/offset before heating cycles (Brent): implemented but figuring when it should happen.

ACTION: Write 'cheat sheet' showing new parameter available for changing during sample collection (Brent)

ACTION: Update firmware on Mack, Bruce, Neo with the 'slightly modified version, and email the changes within this new firmware to everyone (Brent) **DONE**

Brent will work on operational model for temp control. Get it ready for Sept that will be implemented with the MFB. (Brent)

Action Items from last week:

ACTION: Set-up sleepy board and an elmo on desk to emulate (Brent) **In progress:** Can't find elmo but have other pieces.

ACTION: working on a cue of interrupts in the threading environment--[low priority] (Brent): **Not started**

ACTION: Work with the auto-cal code for carosal and alignment (Brent): **Medium priority Not started**

ACTION: Speak with Wayne about his timeline with BIOSA and his ability to commit to low-power studies for us. (Jim): **In progress**

Sphere and 4K DWSMS

- Oil cold testing. Finished? **100 cst goes 150 cst when in cold. It's a significant increase but can be countered by buying lower viscosity oil.**
-
- Screen drawings. Checked? Ready for order? Photofab drawings have been looked at and they have a new spec to send to PFI. The way they fabbed last time they took out too much b/w holes. Doug wants them etched to a certain mass.

ACTION: Scott to send samples and current idea to see if they can do it to weight. (Scott will mail samples to them) Chris and Roman have spec for scintered frits and are discussing how many to order. They have a quote.

- Battery boxes? Scott still waiting to hear.
- DWSM progress? Have ~\$1300 of parts coming into lab to build lung system. Going into Bldg B lab. pumps not coming in yet, but will find hand-pumps. Will start construction next week. Maybe need some days of Jim S.

No word on sphere. Discussion about Tapemation machining and how we should get insurance or discuss protection.

ACTION: Go back to Mark Brown and ask who we should go with (Jim)

ACTION: get inventory of screens from Roman (Jim): Must spec hole size and fix original drawings and talk to manufacturer before ordering. In progress

ACTION: Order two battery boxes (w/out batteries)--~\$4K; account #701312.04: In progress: Scott waiting for lower price

GUI Development

- Mission script progress

ACTION: Will try and have mission script GUI out next week. Kevin will meet with Chris S. (Kevin)

- Adjustment of project #'s in JIRA

ACTION: Kevin will delete one account and the one to use is ESP Gen II. FINISHED

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor. ACTION: how will BIOSA integrate and drivers needed (Brent & Wayne)

25Jul2008

This page last changed on Jul 25, 2008 by [jbirch](#).

Doug on vacation July 14-July 28.

present: Jim, Brent, Scott, Addie, Chris S., Wayne

absent: Doug, Cheri

Instrument Builds

- South Carolina person here **August 20-29** to run Mack & Bruce.
- Brent has found that the front and back puck sensors respond differently to changes in ambient temp (front 19-26%; back 30% of ambient). Thus we should recalibrate to the front sensor, a change that should be transparent to the user.
- 11:00am Monday (7-28). Brent, Addie, Cheri, Wayne meeting to discuss integrating MFB with NEO
- Scott will spearhead effort to get 3 new radio boxes built

MFB

- all pieces from shop should be here by today (except SPE block)
- Jose working on wiring harness
- Must make sure tombstone works with latest Ruby code, then can begin integration. Addie/Brent will work on this separate from above meeting.

Software

- DWSM software is very close to being ready to test
- TUESDAY--Brent/Scott/Wayne are going to pick a part, and populate rev.1 dwarves to test whether 2nd gen of I2C buses are less 'funky' than gen 1.
- WED.--Gomes/Schramm/Roman/Scholin/Birch meeting to discuss GUI needs next year. For discussion: machine state, mission scripting, data parsing.
- Wayne having great difficulty pulling base C code in order to use new compiler. Much work to reduce errors, but he will continue looking into depth of problem.
- Brent waiting to hear from our potential antenna candidate site; if no word by next Thursday, we move to a yet-to-be-determined plan B.

Other Items

- Of all issues on Brent's 'to-do' list after last deployment, only three remain:
 - why did radio link quality decrease?
 - did RS232 CTS handshake line to radio modem fail?
 - failed email messages are not queued for later retransmission.

Deployment Update

- Jim Crisman has moved up his available dates. Means we must MOB Tuesday (Oct 7) and deploy Weds (Oct 8).
 - M0--Bruce with new CTD
 - M0--Neo with old CTD and ISUS
 - SC--Mack with old CTD and ISUS
- Will run room-temp big phase (PCR w/ LAF Bac concurrently) this afternoon. This is the PCR + WCR phase; 20+ hrs.
- Brent still working on PCR/BAC integration
- For the entire deployment, NEO is doing only PCR/WCR and BAC/WCR
- Discussed the schedule (27th would be + cold, 28th would be - cold, 29th would be + cold)
- Running in cold we will use it in box, w/ ISUS and old CTD.

Machine Builds

- Doug assembled harmonic drive on lathe for 'perfect' alignment. Power comparison to be performed this afternoon. We may have to redesign this with 2-shafted harmonic drive which will necessitate a different motor mount for the elbow joint.
- Puck temperature sensor on Moe--need more of them. Jim Montgomery can do this. Mounts for these are old--we need the newer sliding mounts.
- Ball screws--NOOK only made rev. D, which, according to our drawings WAS too small for us, but these seem as tight as the rev. E. Unclear what drawings they have (they say they've always built to rev. D drawings), so we must be very explicit in future orders--put rev on PO and call them for verbal confirmation.
- Dwarf Boards:
 - have tested 15 of 35
 - curious: after hand is closed, we still have voltage to the gripper drive. Must look into this after deployment.
 - Will be finished by end of next week.

MFB

- Syringe has been losing its encoder position and over-filling until it hits the hard stop and overcurrents. First time, it pulled black plunger end off. Syringe has now been replaced and recalibrated.
- Still don't know reason; maybe losing encoder counts (9-30: yes--bug in Xilinx upgrade software seems to cause it; have reverted to older version and problem is gone)

Software

- New CTD's have different firmware. Nontrivial.
- CS syringe on NEO has been changed
- Bruce--got stuck last night. Anytime tried to move a syringe or valve it hangs. It waits for a thread that's already dead.
- Mack--PS and clamp got corrupted (overcurrent errors). Sent out a 'recover' and it fixed it.
- Can't seem to FTP into shore station from his house
- Radio tests worked well, but while one file is uploading, link is monopolized (we can't talk to the other machines)
- Will give radio's to Jose
- Home syringe has been renamed.
- Firmware code still not frozen until Brent fixes: 1. Recover from hang due to dead thread, 2. Link protocols fixed, 3. CTD changes made

DWSM

- Sphere on lathe at Tapemation
- Bulk-heads (swiss cheese plates) awaiting their turn in our shop

- Doug has some parts to be made; will give to Larry or Jose

GUI Development

- Kevin working with Chris Preston on the new 'killer' mission planning app
- data analysis software being worked up right now.

Other Items:

Container:

- We will PURCHASE a container, but defer to future. Container information is [here](#)

Build Schedule:

- Doug unsure if we will be ready for deep ESP testing in first week of January. Issue is that they are setting Lobos days for 2009, and we are slated for 5 days; they want us to take 4 days in Q1 and Q2, and they'll through in the 5th somewhere. We need a schedule from Doug on how the D-ESP testing will proceed with the ship days. Original plan was to start with passing fluid through the sphere, working toward a WF deployment before the big Axial trip. Doug should get a WAG schedule by end of day.

27Mar2008 (Pre-deployment mtg)

This page last changed on Mar 27, 2008 by [jbirch](#).

Present: Birch, Everlove, Jensen, Pargett, Gomes, Scholin

Mack Deployment begins April 3

Mack out of cold, and getting new lid.
Science still to drain waste and add new flush

Will perform 2 runs tomorrow (Friday). A pre-can DA (short) to confirm reagents work, then a full DA.

Monday will load pucks and can it.
Tuesday mount to mooring.

Divers -- Mike Conway, Jason Felton

Crew -- Roman, Scott, Doug, Cheri, Jim

Discussion ensued about our can situation. We have two cans (a good one, and a stitch-welded one) and there was talk on logistics for this 2.5 month network deployment.

[Current schedule](#) is

Deployment 1 is April 3-21 (Mack delivered on Shanna Rae, retrieved by Zephyr).
Deployment 2 is May1-27 (Mack delivered and retrieved by Zephyr).
Deployment 3 will be 2 ESPs (M0 and off SC) May 28-June 30 (Neo and a refitted Bruce via Zephyr)

Schedule Items

- October deployment:
 - Using Shanna Rae; MOB on October 8 (Weds), deploy October 9 (Thurs).

Machine Builds

- Puck sensor boards (10 made) have been modified and [Scott](#) is still testing on GG in the fridge. Will fit in as fridge schedule opens up.
- Mack giving many problems to SC group, who leave tomorrow. [Chris](#) thinks its a PBV calibration problem. Intermittent. Scott will start tackling this on Tuesday.
- Syringe testing: not really time-critical. Will perform after October deployment. [Scott](#) also wants to test on syringe frames in the cold. Still waiting on delivery of 10ml CS.
- [Dick](#) checking Dwarfs and R-valve boards.

MFB

- Tombstone (TS) has worked in the cold. Now re-doing at ambient to compare.
- There was a never-before-seen error in the driver data from the module; maybe the module burped data that Ruby couldn't handle or it could be a threading issue. Bob Herlien is being contacted about this problem.
- Bracket to hold PCR module on grill will be ready Tues/Weds next week
- All syringe speeds on TS are working with voltage regulator on syringe and rotary valves (not heaters).
- Have noticed the gains on the grill syringe are much different than those on the TS, probably due to plunger/syringe tightness differences. Means Grill uses more power than TS.
- Seal on mixing column still not good. New o-rings ordered, will come in Tuesday. [Addie](#) to buy PEEK tubing cutter.
- Stand-Alone power boards are not critical path yet, so [Scott](#) will wait until after deployment.
- [Addie](#) and [Chris P.](#) need to come up with a test plan for the TS/Grill for mounting on a core.
- [Addie](#) will let [Mike P.](#) know that we are mounting TS on Neo for October; mike should start the physical mount Sept 9-11.

Software

- Limit switch code is now working. Small slight tweaking needed, but pretty much finished.
- Mack's brain freeze; stuck doing a single Ruby primitive. We killed process and started again. Will look for it to happen again.
- Upon looking at antenna house, [Brent](#) and [Wayne](#) are making slight changes to antenna location. We want to 'kit' the installation so there will only be 1 visit. Brent continues to try and setup the router/antenna.

DWSM

- [Doug](#) found that bell housing still not finished; next week. Anodizing will use a sodium dichromate seal with no color added to the anodizing.
- much discussion about anodizing to slow galvanic corrosion; Sphere is too large to anodize so perhaps use a polyurethane spray.
- Critical Path for DWSM is the swiss cheese plates. Plans have been given to Ray & Jerry who think they can do it. Must check with them for a timeline.
- Soup can is now a 2-piece Oatmeal can, which we are doing in-house.
- [Scott](#) still to order connectors in and out of DWSM housing.
- Doug explained the possible testing procedures of DWSM in his email: [There are two pressure modes and three assembly options.](#)

[Running modes are: ASME rated \(aka safe to stand next to\) and Exclusion \(put in pressure test facility and run remotely\)](#)

Assembly modes are: 3/8" SS internal screws and open HP motor, 3/8 screws and closed HP motor, or B7 jacket bolts. The HP pump shaft seal has low pressure limit, hence the need for the compensated motor. The jacket bolting needs the complete closed housing assembly, MINK's cables, etc.

	ASME Rated	Exclusion
3/8 Screws, open HP motor	~10 psi	-
3/8 Screws, closed HP motor	220 psi	550 psi
7/8 B7 Jacket	1500 psi	5885 psi

This means that we do need the soup can housing to do any significant development, but that we can run the full cycle (at reduced pressure) before fully terminating everything. The soup can is in the machine shop queue along with a lot of other parts that we need.

- Scott suggested we go ahead and rent a Freezer van to both test the sphere at temp, and use as a pressure test housing for the DWSM. will look into.
- **Scott** to order connectors that go in and out of DWSM housing.
- Doug to order normal Swageloc SS fittings and test corrosive properties against Ti plate.
- Quote of the day:

"Nothing on DWSM will be effected by the cold." --Douglas Pargett 8-28-2008 11:48am 😊

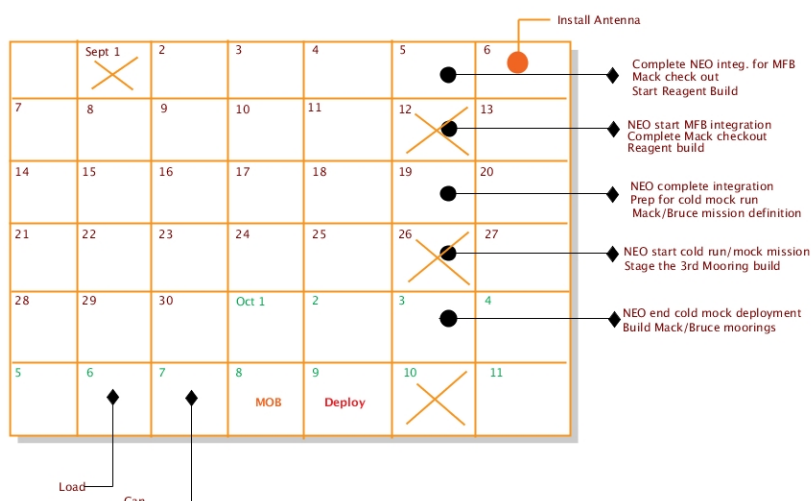
GUI Development

- Kevin making changes to GUI in time for Oct deployment
- Will be finished by Sept 26.
- Still trying to get an evaluation version of machine state software.

Other Items:

Invited paper to Oceanography is due Sept 15. Chris will need help with some figures.

Project Calendar for Sept/Oct:



ESP Engineering Mtg -- Feb 28, 2008

11am-12

Present: Doug, Chris S, Scott, Addie, Brian, Cheri

Tech Transfer

Discussion Items:

- Update on Mack: Mack is beautiful. Doing it's first full phase, right now.
- Mike Parker contacted about piezoprinter problems (holding down membrane, cutting out disks) and is designing solutions. Also will be approached about a puck holder.
- Puck Etching: Next batch to go out... 701312.06 Puck CIP.
- New syringes: Scott to check on them.
- Screens and scintered frits: Leter coded frits were ordered by Jim.
- Need to define a mission script next week for cold test.

MFB

- Weak pos on Mon, but nothing since. Found that reagents were dead. New reagents on the block now.
- LLNL replacing components on the new boards.
- April fecal water sample purification test.

Software

Not discussed, Brent on vacation.

Sphere and 4K DWSMS

- Sphere update
 - No word or update from Wah Chang.
- DWSM progress?
 - Revisiting motor for pumps. Sampling condition would be very power inefficient. Should have a power budget and motor/pump nailed down in a week.
 - Doing torque testing of pump since most of power is lost in running friction for the LP pumps.
- Battery boxes? IN
- Batteries ordered? Yes

ACTION: Change cracked power connector on GG's lid (Cheri)

ACTION: New surface can lid discrepancy, Jim was going to meet with Gene about it. (Jim)

GUI Development

Brian had image handling questions...

30May2008 (Moved to Friday)

This page last changed on May 30, 2008 by [jbirch](#).

Discussion Topics:

May 27-28 deployment

Deployment went off without a hitch. Currently Bruce is at M0 and Mack is at Santa Cruz site.

Have had minor issues with over-currenting on PS, and puck sticking in the hand, but feel these problems are minor and will not jeopardize the mission.

ESP Builds

Once all parts are in hand, it takes 2 months to construct instrument and hand to science for checkout. This is double what we had thought it takes, but with more assembly experience we have seen the error of earlier (optimistic) estimates.

2009 Proposal preparations

Much discussion on what could be accomplished from original 2008 goals. This must be scoped in order to prepare 2009 proposal. Early next week, Jim will get labor estimates on agreed-upon-goals for 2008.

Tech Transfer

- Neo being worked on and will be ready for Science next week. They need to run experiments, as well as we all need a working spare should one of the deployed instruments crash.
- Moe will be the MFB integration machine. Will decide roughly where AIV will be placed, and then Cheri can continue with Moe build. Addie will work with team to decide where to put MFB.

MFB

- Addie has replaced ATV, ARV, all tubing. First slug through the top of the PCR module worked! Running a second at end of Friday.
- SPE columns: We purchased 3 @ \$45; now 3 @ \$120. She ordered 8 pkgs of 3 and 3 holders.
- Must run water-quality samples when Chris P. gets back from meeting. Schedule for week of June 16.
- Addie to start building the next MFB ASAP.
- Ball screws have jumped in price because of coating issue. Will talk with Doug about using a different (cheaper) ball screw.
- Spoke of getting device history, esp VICI--how do they handle/treat their valves during/after manufacture?
- Want to be able to save LED data from PCR block; must work with Brent to be able to automatically save the data-object.

Software

- ESP share was backed-up yesterday. Brent making CD of all data. ESP share should be better organized as it is currently full with lots of junk.
- Stopped and re-started Mack to perform a network fix. Should not effect anything since we have 4 down days (next run is Monday evening)
- Next deployment, we will set-up deployment passwords different from lab passwords so no confusion as to which machine you're on.

DWSM

- schedule CDR--set for **Tuesday, JUNE 10th.**

GUI development

Other Items

- Planning for 2009 proposal

June 5 Have labor #'s for 2008 and have 'nailed' our 2009 projections

June 12 Have abstract ready (due July 1). Chris will be gone June 14-July 9? . I'll be gone June 13-June 29.

ESP Engineering Mtg -- Jan 31, 2008

11am-12

Present: Jim, Chris S., Kevin, Doug, Cheri, Brent, Scott, Addie

Tech Transfer

Discussion Items:

- Results of hand/arm testing.
 - Mack has been cold-tested and Brent is working on temp sensor testing.
 - Bruce--all valves are in, hand mostly assembled, still to finish plumbing
- Mike Parker Machining [list](#) -- working quickly through it
- New hand order. Plans update? Mike ready to go to El Camino? How many? **N**
 - New hands to be ordered this summer. XX hand assemblies + 3 sets of fingers with new fulcrum positions to replace the existing 'new' fingers
- New syringe cost.
 - Still not heard back from company
- New Dwarf Boards. ~\$4K/system with 6 week lead time. Account? How many?
 - Jose still forming the database. Just a core, but all electronics (no MFB), Jose should charge 900612, maybe a subaccount (.99 for CIP)).

Action Items

Action Items from last week:

ACTION: check with Jose about number of dwarves to order (Scott) **In progress**: Jose has mad the first pass through and looks like all components are still available. Jose getting price and lead time on everything.

ACTION: syringes. Wait to hear from company final costs and order #'s and get sample of their new product. (Scott) **In progress**

ACTION: Will cast a new schedule taking into account our current progress (Jim/Cheri/Scott) **Finished**

ACTION: Order fluidic fittings for cores and MFB (Cheri) **Finished**

ACTION: Will drill out pressure sensor holes in clamps when we revalve the cores. (Scott/Cheri) **Finished**

MFB

Discussion Items:

- Getting excellent yields out of solid-phase-extraction--Good job Addie and Chris P!!
- Mixing column basically finished
- next week will make extract from seawater lysate and compare to bench-top
- in parallel, do dye tests with heater block.

ACTION: Hook up heater block and test diodes for fluorescence sensitivity. (Addie) **In progress**

ACTION: Will work on figuring cable problem to three-way valves. (Addie) **Finished**

ACTION: Mike will bore out stator on the mixing column so we don't need more mix tubing or reducing fittings. (Addie) **Finished**

ACTION: Fan not working on PCR module and Addie will try and track down why (check in various terminal/call LLNL) bob said he's never had the fan turn on or off with that module. (Addie); **Finished**

Software

- puck heating control
 - now can send a temperature to puck and it gets there in 2-3 minutes with little overshoot

- Brent would like to pull calibration values out into a structure, since they are different on each instrument

Action Items:

ACTION: Finish by Feb 6 the temperature calibration model, incorporating Scott's prior work if possible. (Brent)

ACTION: make another temperature puck (Scott)

ACTION: Write 'cheat sheet' showing new parameter available for changing during sample collection (Brent)

Action Items from last week:

ACTION: Set-up sleepy board and an elmo on desk to emulate (Brent) **In progress:** Can't find elmo but have other pieces.

ACTION: working on a cue of interrupts in the threading environment (Brent): **Low priority Not started**

ACTION: Work with the auto-cal code for carosal and alignment (Brent): **Medium priority Not started**

Sphere and 4K DWSMS

- Screen drawings.

Battery boxes? **Scott still waiting to hear.**

- DWSM progress? **Have ~\$1300 of parts coming into lab to build lung system. Going into Bldg B lab. pumps not coming in yet, but will find hand-pumps. Will start construction next week. Maybe need some days of Jim S.**

ACTION: Waiting for company to return yes/no on whether they can manufacture screens to mass instead of size. (Doug/Scott) **In progress**

ACTION: Order two battery boxes (w/out batteries)--~\$4K; account #701312.04: **In progress:** Scott waiting for lower price

ACTION: Go back to Mark Brown and ask who we should go with (Jim): **Finished** (Tapemation is it unless we want to go back east)

GUI Development

- Mission script GUI introduction

Kevin showed how to use the mission script GUI located [here](#).

Bugs for this GUI can be reported [here](#).

On Table:

Chris P. must work with Brent before spring deployments to solve sampling problem

Chris P. and Brent need to address high volume issues for Sept deployment.

BIOSA integration as a contextual sensor. ACTION: how will BIOSA integrate and drivers needed (Brent & Wayne)

This page last changed on Aug 05, 2008 by [jbirch](#).

Present: Jim, Brent, Scott, Addie, Chris S., Wayne, Kevin, Doug, Cheri

Instrument Builds

- South Carolina person here **August 20-29** to run Mack & Bruce (Tina Mukulsky (sp?))
- Temp re-calibrations of Mack finished and has updated firmware
- Bruce has 2 of 3 calibrations; will be finished by end of the day
- Roman will help with verification check.
- Scott will spearhead effort to get 3 new radio boxes built

UPDATE: Friday, a combination of issues caused puck-temp sensors to be torn from their mounts, so machines will be recalibrated beginning Monday.

- Mooring update:
 - Scholfield is leading the charge on building the 3rd mooring
 - We need to order 1100 D-cell alkalines. Scott needs charge number

MFB

- cables are finished
- software integration moving along nicely
- grill is very close to being operational. Still waiting on SPE heater from Mike and the LLNL PCR block.
- Need Scott to integrate SPE heater onto the heater board
- We should think of insulating the SPE block

DWSM

- Sphere update--point cloud has been provided by Tapemation
 - issue is how to cut
- Ti screws might be very expensive for the size we want. Doug exploring helicoils as good alternative. Decision needs to be made before Tapemation begins machining.
- Bell Housing needed slight modification since part ordered by El Camino was too short. Other parts are now in machine shop!
- Doug wants to try and do swiss cheese plate in-house.
- Most COTS parts are here--still need Mini-Con's, Swageloc, various connectors/cables
- Electronics--Boards laid out; Scott wants miniEE review late next week
- Note about elevator assembly-- want to be able to open and 'get at' sphere
-
-

Other Items

- Kevin estimates \$10K for machine-state visualization software
- Brent wants to test limit switches--can do w/ stuff on his desk
- Still must do radio test--configuration with 3 radios
- Brent found another antenna place
 - we will draw up a 'contract' detailing time, it's our stuff, we'd pay for his cable, give notice of renewal--Jim to work with Brent on this.

Tech Transfer

- Although only calibrated to room temperature, Neo is ready to make lysate. After a positive result, will run DA tests, then remove those reagents and finish cold and hot calibrations. Then give to science for exercise.
- Moe: waiting on boards, motors, and machined parts. Scott pushing to have boards finished by early July.
- Must determine where AIV valve will go when merging MFB on Moe core, and update solid model (**To Do: Addie/Cheri/Scott/Chris S**)
-

MFB

- Despite repeated failures of the MFB, Chris S. states, "we are homing in on it..."
- cc Addie any emails from LLNL
- Must address changing of power supply of heater/MFB/extraction (**Action: Addie & Scott**)
- Next week will move MFB to Bldg A lab and then run stink-water T/W/Th after Chris P returns from Microbiology mtg.

Software

- Mack's hand has stuck twice during the current deployment (now on day 8) and Brent thinks it's getting worse.
- Must get more people on the beeper system, and he will train Cheri & Scott how to fix.
- Brent will stay on Kevin about GUI development, though next deployment is in Fall.

DWSM

- CDR will be 10am Tuesday, June 10. Will invite same people that came to PDR. Jim will get room.

Other Items

- Laid out and discussed plans for 2009. Plans concentrated in 4 areas:
 - development of 4K system, culminating in cruise to Axial seamount in Q3.
 - bench testing of MFB/PCR either here or in S. Cal as part of the EPA epidemiological study.
 - pier deployments in S. Cal for water quality
 - drifter study culminating in HI deployment, again in Q3

8May2008

This page last changed on May 15, 2008 by [jbirch](#).

Meeting Held?

Birch at NASA review.

Tech Transfer

Deployment

MFB

Software

Sphere and 4K DWSMS

Doug has leak-tested all combinations of old and new cans/lids, and all have passed He testing. We will keep (and pay for) everything from IMT, despite not getting the requested reports during manufacturing.

GUI Development

2009 Deployments

This page last changed on Jan 04, 2010 by [jbirch](#).

These are deployments during 2009 arranged chronologically (colors are same deployment)

April 6--Bruce at M0 for surface deployment (Zephyr)

April 15--Mack in Sphere (dive #1) for first D-ESP engineering dive < **cruise CANCELED because of wind**

April 23--Mack deployed in Sphere (dive #2) off Lobos. Took it to ~ 700m. One DWSM pump was non-functional. Doug later discovered fuzz from bag was caught in impeller.

April 29--Recover Bruce at M0 (Zephyr)

May 1--Mack in Sphere (dive #3) connected to DWSM; incredible success. Nat Geo filmed dive. (Lobos)

May 14--Deploy NEO w/PCR, surface deployment (Zephyr)

May 27--First Drifter dive; used weighted cable (Zephyr)

June 5-9 -- Western Flyer Trip. D-ESP, Drifter, and CTD casts. **MOVIES:** D-ESP launch is [here](#) . Drifter launch is [here](#) .

June 11 -- Recover NEO. (Zephyr)

FALL Network Deployment

Proposed locations are here: <http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=113879459163411006053.000471828af997bd7d89c&t=h&z=12>

September 24 -- Deploy Moe w/PCR at M0. Deployed Mack at Santa Cruz. Deployed Bruce in the bight. (Zephyr) Lost communications with Bruce that day.

September 28 -- Recover (dead) Bruce. Comms box had water in it, but radio worked. EM cable had 2 broken wires. (Zephyr)

September 30 -- Deploy D-ESP on MARS (Lobos). Hand issue at first, but 'fixed' itself. Worked until Oct. 7 when wrong puck was loaded and water introduced into core, frying puck heater. We turned off and first recovery day (Oct 13) is weathered out. It still awaits recovery.

October 14 -- Re-deploy Bruce (Zephyr). New comms box, re-terminated EM cable. Working well after deployment.

October 20 -- Install pump system on pier at Santa Cruz Wharf. October 22 -- Neo installed on SC Wharf.

October 30 -- Recover D-ESP off MARS (Lobos).

October 29 -- Recover both Moe from M0 and Mack from Santa Cruz (Zephyr).

November 2 -- Recover Bruce from the bight (Zephyr). This ends Fall Network Deployment.

November 25 -- Recover NEO from SC Wharf.

December 14 -- Deploy D-ESP (Gordon) on MARS (Lobos). DWSM hiccuped on morning of Dec 28. 'Empty' switch seems damaged. Decided to stop sampling, exercise MFB with elution water negatives, and recover D-ESP on Jan. 7, 2010 w/ Lobos.

Comments

Deployment 2 Neo. The processing dwarf bug (PDB) manifest today first processing syringe position error with reversal. After Cheri recover syringe then processing clamp errors out but is recovered.

Posted by [maro](#) at May 27, 2009.

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2009 Meeting Notes

This page last changed on Nov 18, 2009 by [jbirch](#).

1. [08Jan2009](#)
2. [15Jan2009](#)
3. [22Jan2009](#)
4. 29Jan2009 - no meeting; ASLO
5. [05Feb2009](#)
6. [12Feb2009](#)
7. [19Feb2009](#)
8. [26Feb2009](#)
9. [05Mar2009](#) --First drifter attendance
10. [12Mar2009](#) --crew and machine assignments for upcoming deployments
11. [19Mar2009](#)
12. [26Mar2009](#)
13. 02Apr2009 --Jim in DC
14. [09Apr2009](#)
15. [16Apr2009](#)
16. 23Apr2009 - no meeting; first D-ESP deployment
17. 30Apr2009 - no meeting; final D-ESP deployment tomorrow
18. [07May2009](#)
19. [14May2009](#)
20. [21May2009](#) --2-week plan leading to Flyer deployment
21. [28May2009](#)
22. 04Jun2009 - no meeting; Flyer deployment
23. 11Jun2009 - no meeting; Neo recovery with Zephyr
24. [16Jun2009](#) --Axial cruise decision
25. [25Jun2009](#)
26. 02Jul2009 - no meeting; 4th of July break
27. [09Jul2009](#)
28. [16Jul2009](#)
29. [23Jul2009](#)
30. 30Jul2009 - Scott ran mtg; proposal preparation
31. [06Aug2009](#)
32. 13Aug2009 - cancelled; proposal/grant preparations
33. [20Aug2009](#)
34. 27Aug2009 - Jim Vacation; Scott in charge
35. 03Sep2009 - Jim Vacation; Scott in charge
36. 10Sep2009
37. [01Oct2009](#)
38. [08Oct2009](#)
39. [15Oct2009](#)
40. [22Oct2009](#)
41. 29Oct2009 - Jim LLNL;Engineering & Chris S. set-up schedule for next MARS
42. [05Nov2009](#) -meeting of all ESP team on 03Nov
43. 12Nov2009 - R&D 100 Awards in Orlando
44. 19Nov2009
45. 26Nov2009 - Thanksgiving

This page last changed on Oct 01, 2009 by [jbirch](#).

Present: Chris S., Wayne, Chris P., Roman, Doug, Jim, Brent

Absent: Cheri, Scott

Machine Builds

- NEO is ready for new lid. Needs bulkhead valves, brackets, and top of can fittings. Getting ready for pier deployment.
- Two of our radios need repair. Brent has RMO #s and will task Cheri with their return.

MFB

Drifter

- Jon Erickson's 2009 time on CMORE to design a 200m can is on-hold pending Gene's end-of-year review on drifter feasibility.

Software

Deep ESP/DWSM

- Doug's detective work found that the SS parts sitting in 2% bleach was causing rust, specifically crevice corrosion. Using more dilute bleach (0.2%) followed by water wash should be okay to the metal.
- We have a quote from FloTech for the Benthos ducer baffle. Will tell Hans told to order; charge \$3600 to ASTEP II.

GUI

Deployment Issues

- Brent noticing hand jitter on both Moe (at M0) and Mack (at SC). Thinks its from belt tensioning changing and slower sampling rate of the firmware. These have slower 32hz sampling protocol in the firmware. Gordon has newer 64Hz, and tuning doesn't need to be so precise.
- Bruce's cable has been dissected, and it is thought the break in leads #1 and #2 occurred ~2 inches from the start of the bell termination housing on the bailer end of the EM cable. Jim Scholfield thinks he can get it re-terminated with the remaining EM cable to be ready next Thursday. This changes our plans for Bruce, which we will now try and 're'-deploy on Monday or Tuesday (Oct 12/13). Will check with Grech about which will work for DMO; maybe go with Shana Rae if needed. Roman will dunk radio-box looking for leak.
- D-ESP. After plugging in, hand seemed to jam a puck at top of stack #2. Brent and Scott seemed to fix it--it's now run 3 shuffle puck routines, and Brent has pumped water through the core. Mission will begin tonight. Ideas for figuring out why it did this was to cold-shock it in the van, and use dial indicators to see how much physical change cold actually induces.
- Brent noticed that when turning off power to DWSM, the compensating temp gauges in the new pressure sensors cool down, so when powered again, there is all sorts of funkiness while they re-warm. Decision is to leave Gordon on all the time.
- Chris P. published Gordon's mission [here\(v4\)](#).
- SC pier deployment. Pumps are both in Bldg B lab near the eyewash. Brent and Jim will go to Pier Weds to work on setting up communications. Meet with city officials next Weds about using their network to communicate with our system.

Other Items

- For those listed on the R&D 100 award, there will be a ESP TEAM PHOTO on Monday. Time still to be set-up with Todd. Stay tuned.
- There is a new listserv for discussion of ESP problems and technical issues: ESPTECH. Please use that when discussing difficulties. Dirty laundry, even if about to be cleaned, still stinks...

This page last changed on Feb 11, 2009 by [jbirch](#).

Present: Chris S., Jim, Brent, Doug, Wayne, Scott, Cheri
Absent: Addie (maternity)

Machine Builds

- Feb 23 Cheri finishes core builds and calibrations
- New battery connectors for surface-can lids have been ordered.

MFB

- Cheri will ship 3 MFB kits to McLane tomorrow. Chris S. will cut PO to pay for assembly of 2 of them. Kits will not have instructions included. Tim can get copies of things when he's out next week for core assembly
- USCS people now finished with MFB01 and we can proceed with integration on MOE. Will do it the week of Feb 17; next week Scott will work on single connector, week after that Cheri can do mechanical merging.

Software

- Ruby patch on all machines except MFB02, MFB03, Gordon, and Betty.
- Brent needs more cables:
 - serial & debug cable (10-pin to DB9)
 - PCR w/ level-shifter
 - J-TAG cables
- Discussion about the need for more (newer?) laptops. Brent and Jim will talk to Todd.
- McLane needs one laptop that runs LINUS. (this typo purposely inserted to see who reads these notes). Again, will talk to Todd about getting a machine.
- Checksum difference--Wayne DID get correct bits eventually, so gave to DWSM and seems to be working.
- Wayne, Brent, Scott, Doug to meet at 10am tomorrow to discuss DWSM issues
- Wayne thinks 1 more day on dPress stuff and hardware and he'll be finished with DWSM hardware
- new Ethernet extenders shipped out today

DWSM

Sphere

- Sphere is approved to 4000m! Hooray.
- MACK is designated core for Deep ESP tests. During June Flyer cruise, we will be using a new build (TBD).
- engineering will get MACK the week of Feb 23.
- Doug can fit any core into sphere, giving time to cold-test MACK
- Before that, GG will be cold tested in chamber to -2C, then put syringes on Mack.

Elevator

- CRP may be moving up their foam delivery date to mid-March due to some prior order cancellations
- It will need machining; still to determine who will do that
- Modem; we only have USBL transducers on the ships, but not lots of track record with this modem for both communications and release. Brent will talk to Dale Graves about this to help us decide what to go with.
- Although it's a back-burner issue, Doug will check with Flyer winch specs to see if it would be possible to use Spectra line to help place the D-ESP.

DWSM

- SeaConn will deliver elevator cable MARCH 13
- for wet-mate connector, we will use FOCE spare ODI connector--terminate exactly same way as on FOCE.

- Question as to whether the SIM-Can will go with us on the Northern Expedition.
- One pump on DWSM seems bad; Doug looking into getting replacement
- Brent will start working on DWSM control next week, after latest firmware on all dwarves.

Other Items:

- light puck testing not yet finished
- Teflon retainers & O-rings--Chris S. hasn't done anything yet
- Need to re-machine puck top to accept new o-ring arrangement to hold against scintered frit. Doug to talk to Mark B/Mike Parker about this.
- Van. Will meet with Chris to discuss \$\$ for this. Needs to go down to 2 degrees C.

05Mar2009

This page last changed on Mar 06, 2009 by [jbirch](#).

Present: Jim, Brent, Doug, Wayne, Cheri, Chris S., Scott, Gene

Absent: Addie (maternity)

Machine Builds

- Gordon and Betty
 - hand builds; modifications are in the shop but not an official shop work order
 - some parts simply made incorrectly (El Camiino)
 - Cheri will put into system today and we will prioritize
- Shallow lids
 - simply use different port on lid so no modification needed.
 - will use old power hole for Gene's pressure transducer
 - Bottom line: No new hole in lids. Doug looking into whether there is a seal available.
- Light Puck
 - The Phase config file was to be machine independent. But now we're seeing differences in cameras, so Brent's putting a machine-specific 'multiplier' into the phase config that references each individual camera.
 - In the light puck vs. matched-array comparison, results are difficult to interpret. Will be using matched-array results so we will have instrument-specific calibrations--not ideal. For the moment, every machine has its own calibration & we'll multiply to make them the 'same'. Eventually the calibration will be empirically derived.
- Bruce is out of focus. Will not touch until after April 1 deployment.

MFB

- MFB's to ship to McLane this PM. Will ship without PCR tubing.

Drifter

- Design review today at 1:30 to discuss issues that may impact the foam design
- 1st test deployment is May 14.
- Must mount in ESP can: pressure transducer, accelerometer, serial->ethernet, ethernet hub and extender. Gene to work with Scott and Doug on this.
- Top-side
 - Cable goes to slip-ring -> eventually to host board that'll talk to Iridium modem. Host boards on top will need DHCP--otherwise we need to assign static IP addresses
 - Gene has found that modems are soon to be obsolete--Dec 2009. \$1750 ea/ we need 2. Gene looking into buying new vs. old. We could simply borrow one for test deployments.
 - Brent wants to get old phone modems to do testing that will exercise our software.
 - Plan is to use lead-acid batteries in plastic pipe. This setup is putting off the ultimate alkaline battery pack build.
 - NEXT meeting will update on fitting stuff into core.

Software

- dPress boards; still can't read registers. Wayne working on.
- Brent not started on DWSM yet.

Deep ESP

Sphere

- Spider construction. All parts are machine shop. Will be finished today.
- Frank F. will do welding week after next in the high-bay. We'll have to get the sphere bottom out of its crate for that.

Elevator

- Foam should be ready March 15.

- Frame has been shipped to LA for heat treating.
- doug has ordered shock-load feet.

DWSM

- spider being welded today. sphere bottom is in machine shop.
- Power budget for modems not figured yet. this is critical path for June deployments, not earlier.
- interface boards ready next week.
- Big issue is high pressure pump:
 - 2 pumps are bad: 1st is being repaired--stuck piston, 2nd showing same issues. Either too much air in it or debris. Doug waiting to hear from manufacturer on why they aren't working and he has some ideas for modifying pump.
 - 1 bad motor--melted plastic inside, but then broke free; it now 'works', but is not trustworthy enough to deploy.
- Much discussion on whether we should have a timed or thermal time-out in software to shut pump down. **I was unclear what was decided.**

Other Items:

- Van: not leveled yet.
- June cruise we hope to go to 2900m. Axial will be 1600-1800m.
- Will get Mack into cold-testing March 16. Do we switch syringes to cold-rated syringes? **I was unclear what was decided.**
- GG will be core used to do sphere fitting, next week.
- Pfeiffer turbo pump will be serviced. Factory (not NST) calibration is fine.
- Chris S. pressuring Vrijenhoek on whether they want to use HV pucks. Chris will find out what Bob wants and how many.
- Scott will submit order for retainer rings.

05Nov2009

This page last changed on Nov 04, 2009 by [jbirch](#).

Present: Cheri, Doug, Brent, Jim, Scott, Chris S., Chris P., Roman

This meeting was called mainly to discuss:

1. Gordon repairs
2. Schedule up to the next MARS deployment (14Dec2009)
3. Adding o-ring groove on collection clamp
4. Steve Hallim visit Monday

Machine Builds

MFB

Drifter

Software

Deep ESP/DWSM

- Looks like all errors on the first MARS deployment were due to a loose set screw on the motor gear that rotated the carousel. This is easily repaired, and there was much discussion on how to fix in the future. Immediate solution (short of welding gear onto motor shaft) is to machine larger slot in base to allow movement testing of gear tightness, and calibrate hand and carousel from both directions.
- New temp sensor has pigtails and now has been dipped in conformal coating for x-tra protection. We should test to see how well coating works.
- O-Ring groove. We will NOT do it for Gordon, but begin the design/machining/testing process, using Betty. We will calibrate her first without the mod, then after the 14th deployment add the change and compare calibration numbers.

GUI

Deployment Issues

- Calendar for upcoming MARS deployment hammered out with Science. Rough sketch hanging on fume hood in Scholin lab.

Other Items

- Steve Hallim from the VENUS project (Canada) is arriving Monday to discuss possible placement of ESP on their cable system.

Present: Kevin, Wayne, Jim, Doug, Brent, Cheri, Scott

Machine Builds

- Cores/MFB's:
 1. MFB #4 and #5 had wrong firmware which was causing the sticky syringes.
- RE: Monika having problem w/ re-setting of valve. Issue was that stand-alone software configuration had burkert positions opposite those of the integrated configuration. Now fixed.
- During cold testing of MOE, found that puck thermal sensor was corroded. Changing and recalibrating a new one is a nightmare; Cheri/Scott to work on building a jig that allows 'precalibration' of the finger sensor boards.
- Julie noticed that forearm not acting reliably--seems to be electrical connection cheri will fix.
- Must re-machine hand armature for new home sensor placement.
- Board boxes are here that we will use to send core board-set to McLane for their EPA build.

MFB

- Brent has been wrestling with a firmware issue related to the PCR modules using a serial connection, and their inability to acknowledge recpt of an abort message. There is a relatively easy band aid if, using his serial port analyzer, Brent can't think of a better solution.

Drifter

Software

- Brent's firmware that runs motors is going very well.
- Noticed that his DWSM code has all polarities reversed because wiring in DWSM is reversed. We will keep the software intuitive and fix DWSM wiring ; Scott to check out what this entails.

Deep ESP/DWSM

- High-pressure pump is finished and has been run at 200(?--low) pressure. Both bell housings are apart, and we will wait to put the tops back on until new transducers arrive Aug 24. PISSer should be ready for use with DWSM by end of week.
- Minor problem with blue oil bag; fitting broke inside; Doug will look at. Now using a bucket as the oil reservoir.
- All parts here for heater ring inside ball; Doug to hand-off to Jose.
- Sphere insulation is cut, but not installed. Doug to do.

GUI

- GUI branch is running today (Chris P), and generating log data for Kevin to play with.

Deployment Issues

- Sept 24 triple deployment. Moe at M0, Bruce at Santa Cruz, and Mack in 16m of water only 5-7m deep. Will needto adjust mooring for that one.
- Sep 30 is MARS. Brent has to give talk that evening so may not be on ship unless guaranteed to be back early.

Other Items

- LabAutomation meeting in Palm Spring Jan 23-27, 2010. Must select who can/wants to go.
- R&D 100 award banquet Nov 17. Still working out logistics on who will go.

This page last changed on May 07, 2009 by [jbirch](#).

Present: Scott, Brent, Doug, Chris S, Jim, Gene, Kevin

Absent: Cheri, Addie, Wayne

Machine Builds

- Harmonic drives in and Cheri working on switching them out
- McLane making progress on MFB's after I2C issue last week.

MFB

- #1 is on NEO. #3 is on Moe. Just Received #4. All are running firmware version 4.03. Also rec'd our fourth module (labeled #5).
- Tony Makarewicz leaving LLNL tomorrow, May 8.

Drifter

- May 13 dive day moved to October; First drifter dive is Monday, May 18. it will consist of Chris S., Gene, Scott, Jim.
- will use the E/M cable, but with a sealed end and a RR rail piece as the weight.
- Code is still in rudimentary stage. Gene would like someone to ask Linux/ C++ questions of if he needs. Kevin/Danelle/Brian K were volunteered.
- Hope to get in test tank by end of next week.
- Chris S. will fill out pre-cruise
- ppp connection has not been worked on for a week. Brent will provide Pete with cheat sheet and freewave manual to help him get started on the configuration.

Software

- Gordon will NOT get modified ethernet driver. Deployments will not be long enough to warrant the power savings by changing the hub in the sphere, and Wayne is not here to help with the driver change.
- Code currently resides on Neo branch, Main branch, and GUI branch. Much discussion on when to merge; on Gordon in lab tests we'll use GUI branch. **After June cruise we will merge GUI line with main line and run checkout on Gordon then.**
- Wireless comms. Decision is to use Freewave's to communicate wirelessly with the sphere. This requires a MINK connector/fitting; Scott will scrounge up/buy.

Deep ESP

- Wand/valve tree. Doug can only get SS valves. He using some that Cheri has. They need minor modifications to be oil-compensated.
- Cables for valve tree have been ordered; should be here in 2 weeks
- 50' of cable for wand delivery
- Some discussion of tubing needed for wand, but a McMaster item so little lead-time.
- Wand stand still to be designed. Most likely will be something like a microphone stand.
- Doug has plans for a sectional bumper design for Oregon cruise.
- DWSM restarted and all switches worked. Doug and Brent to meet after to find out what might have gone wrong.

GUI

Deployment Issues.

Other Items:

Jim in late Monday; picking up TWIC card.

08Jan2009

This page last changed on Jan 08, 2009 by [jbirch](#).

Present: Jim, Chris S., Wayne, Brent, Doug, Cheri, Scott, Jose

Absent: Addie (maternity)

Machine Builds

- Two new cores are being kitted by Cheri.
- Syringe and rotary valve parts were inadvertently left off original (July) El Camino order. Mike P. pushing those through and should be ready by Jan 23.
- Discussion on McLane visit for core builds. Decided to have them reserve 2 weeks; Feb 8 and Feb 22. If they really work the first week, maybe stay longer and make it just one trip out.
- Cheri has drawing of new harmonic drive mount. We need it manufactured. Will talk to Mark Brown about getting some (Non-Mike Parker) help.
- Cold syringe testing. Not finished. Deadline is when we put a core in the sphere (late March).
- Next two Sleepy core boards need names. Cheri will spearhead that effort.
- Pucks. Chris S. wants to revisit high-volume puck issue and the machining of scintered frits. Several solutions batted around. Chris will look for HV pucks and we will discuss next week.
- We will integrate MFB01 with Moe the week of Feb 1.
- Scott trying to get a workable ORCAD part number scheme to keep track of our wiring harnesses. Working on this with Jose.
- MOE is the CMORE/Moore/NSF machine that will go to Zehr lab and run in surface waters at M0.
- Who goes into sphere? Initial tests do not require PCR, so Mack or Bruce could do it.
- In June we could put NEO in sphere--must decide thi in April.

MFB

- Cheri will work on kitting up the 7 MFB's for the McLane build. She should be able to ship them by first week in Feb. Chris will call and give them a heads up to expect the kits.
- Some question as to whether we cut tubing, or McLane does it. Has that been included in their \$4500/each quote?

Software

- CTD bug. still a longstanding bug. Brent given problem to Bob Herlien, who know says he doesn't have time to work on it. Brent thinks he'll need 3-5 days. Jim to check to see if he can even do it.
- Bufflehead is moving to the lab to give Brent some more space in his office.
- NEO--running old Ruby code with newly patched Ruby compiler. Moe has latest Ruby with same newly patched compiler.
- Decision to keep NEO it's own little old island of code, but upgrading ~1mo before it may be deployed. This will allow Chris P. to continue with MFB work without changing anything (or having anything break).
- Wayne has all CPLD code cleaned up and into CVS. He's also built many more test benches. Monday will be picking up on MSP430 software development.
-

DWSM

Sphere

- All connectors are in for the sphere. We will move it to Bellingham AUV lab Monday for install. Plan is still to get it shipped to SRI late next week.
- Decision is to ship it **disassembled**.

Elevator

- Mike Parker waiting for solidmodel from Doug. Will send today.
- Currently, elevator has no legs. Doug has designed 6 8" standing legs, and 3 adjustable legs for ocean bottom landings.
- Adjustable legs being designed for up to 20 degree slope.

- Jim will talk to Mark Brown about getting Mike Conway help on drop-weight design.

DWSM

- Mechanically, DWSM is 95% complete.
- Software interface still needs design and many electrical connectors/cables to order. Brent and Scott are on it. They will meet with Doug to create config file that is usable for testing.
- Cable connection; we need a short one to connect to ROV, longer (80m?) to connect to MARS. Craig Dawe may be able to help with this; connectors have long lead time. Scott to talk to Craig, Jim to Etchemendy.

GUI Development

- no developments reported

Other Items:

- Next week will have two off-line mtgs:
 - Scott, Brent, Jim, Chris, and Gene to discuss drifter integration
 - Brent, Jim, Chris, and Kevin G. to discuss GUI development

This page last changed on Oct 12, 2009 by [jbirch](#).

Present: Cheri, Scott, Doug, Brent, Jim

Absent: Chris S.

Machine Builds

- PCB's for a core build have been sent to McLane. Scott working on cost calculation to send them.
- Doug has first Ti HV puck tops. Will work with Roman on whether they are appropriate.
- Screen drawings have been modified so holes are smaller (=stiffer metal). Must compare to PO drawings to find most recent.
- Cheri tasked with assembling a 'spare' kit and we will get this x3

MFB

Drifter

Software

Deep ESP/DWSM

- Over weekend, water was inadvertently let into the sphere (~500ml) due to the wrong puck (LAF) being loaded. All things looked okay, until we tried the next SH1, and the puck heater started giving wild readings. It is probably fried. We will run some core negative PCRs, and recover next week (Tuesday) if weather permits.

GUI

Deployment Issues

- Brent working on networking the pier deployment. Will acquire larger antenna(s) and working on VPN issues. Possible trip down there Weds. Deployment looking to be during the week of the 19th.
- Doug will talk to science about designing the Pier-water Introduction System (PIS).

Other Items

- Harbans Dhadwal (Stoney Brook, NY) will be visiting Friday, Oct 30. He'll be learning about basic MFB functions. Will need a 'cheat sheet' of commands, and maybe the 'training' can used colored water. Cheri on this.

09Apr2009

This page last changed on Apr 16, 2009 by [jbirch](#).

Severely truncated meeting while Scott, Brent, Doug, Wayne worked on getting D-ESP ready for deployment.

09Jul2009

This page last changed on Jul 09, 2009 by [jbirch](#).

Present: Wayne, Jim, Doug, Brent

Absent: Cheri, Scott, Kevin, Chris S.

Machine Builds

- Betty cold testing--3 issues:
 1. at 2C there are borderline issues with carousel viscous friction, most definitely at -5C. In current firmware, we can just run slower so no overcurrent. In new firmware we can limit PWM so there is no overcurrent (it'll just run at different speeds at diff temps)
 2. Elbow misses and retries--does it at 2C and more often at -5C
 3. Hand won't close around clamped puck--this was the Mack issue that we've been unable to repeat. Has Cheri looked at hand alignment?

Brent will check with Julie to see when MOE will be cold-tested. Still working on getting a new box from Scholfield built.

MFB

- heaters #10 and #12 arrived today

Drifter

Software

- Brent working to merge our 3 firmware versions. All looks good but he's now wrestling with code to allow different acceleration/deceleration rates.
- Brent would like to collaborate with UCSC people for radio comms for the fall triple-deployment.

Deep ESP/DWSM

- PISSer
 - Doug and Brent discussed many details of Pisser architecture
 - Will move GG on Monday; plug in when Scott here and re-create problems seen on Flyer cruise
- Pressure Transducer
 - Will go with Stellar in NJ. Will go with 8-pin out; Brent waiting for final quote. Will approve PO today.

GUI

Deployment Issues

Other Items

- discussion of G3 ESP showed that we need a better list of functional requirements for this next generation ESP. What does science want to accomplish with this new instrument, where must it work, for how long, what are weight/vol constraints, etc. We will start thinking of something to go in the LRAUV, but these questions need answering before serious engineering can occur on mechanisms...

12Feb2009

This page last changed on Feb 18, 2009 by [jbirch](#).

Short, touch-base meeting with Jim, Scott, Brent, Kevin, Wayne.

Main issues:

dPress code reveiw will be week after next.

Wayne still to port C-code from old tool-set to new tool-set.

Drifter to use Iridium modem. Does Brent know about this and is he good with it?

12Mar2009

This page last changed on Mar 12, 2009 by [jbirch](#).

Present: Jim, Brent, Doug, Wayne, Cheri, Chris S., Scott, Kevin

Absent: Gene, Addie (maternity)

Machine Builds

- Gordon and Betty. Cheri predicts 3 weeks to finish if hands don't give her too many problems
 - Maxon stopped making old motors, and these new ones (with mylar cable) produce much less torque. Maybe windings are for higher voltage. Cheri will test. We currently have 1 old motor and 3 new ones.
 - We ordered 2 more harmonic drives. Moe has GG's lower hand and it will need to be changed out
- HV pucks. Tops have been machined. Doug or machine shop can turn spacers. Cannot get different softness of o-rings from McMaster, although Chris doesn't think we need different ones.

MFB

- 3 MFB's have been shipped to McLane for build.
- Spoke with LLNL yesterday. John promised 2 modules by March 20 (2009). Then 4 by end of April, then 4 remaining 'after' that. New modules have different firmware (v 4.04 vs 4.03), so we'll have to get our two switched eventually. New firmware expands the data buffer and has better error handling.

Drifter

- Gene out today. Wayne will start communications testing next week. Not using TCP, so this might be a problem. Will go with freewave modems (not iridium) and GPS for the drifter deployments.

Software

- Bruce has been running the new software off the network for several weeks with no problems. Monday Brent will burn this software into Bruce's flash, and we'll start exercising it as a local machine.
- Much discussion about Bufflehead being full and Chris P losing data. We need a science data-manager (John Ryan?). Currently need to delete old stuff.
- Today, Brent will backup and delete stuff older than 1 year.
- Jim will go to IS to see if we can get more space on the ESPshare, although cost may be prohibitive.

Deep ESP

Sphere

- Paul Coenen continues with wiring.
- Vicor mounting brackets are finished. Assembly continues

Elevator

- elevator is back from LA, but there may be some distortion. Doug going out for a look this PM.
- We can finish elevator construction with Mike Conway and Paul Coenen.
- Scott will move foam and other crated sphere half out of parking lot and into bldg D.

DWSM

- Switch boards are finished and we'll give to Wayne after this meeting so he can test his dPress code. Then we can put bags in oil.
- High pressure pump. Still waiting for return from Emeryville. 4500psi will get us to 3000m. We have a fall-back site if we need to go to only 1800m.

- During the 'repair', some parts were re-machined, thus we hope that fixed things. We will tighten bolts on current pump we have hoping that will stop back-flow above 2000psi.
- If nothing works, our options are to go to shallower sites where not as much pressure is needed.

GUI

- Brian has begun work on image analysis software. Working with Nilo.
- Rich coming back to project to work on parsing data files.

Deployment Issues

- April 1-28 surface deployment using BRUCE. Roman will get divers and is leading this Zephyr deployment. Will use NEWEST mooring. Brent/Cheri will work on radio testing. Scott will get Jose's group to ohm-out E/M cable.
- April 7, 14, May 1 -- Deep ESP tests using MACK (with new low-temp syringe plungers).
- May 12-June 11 surface deployment using MOE w/PCR (if ready).

Flyer at Juan de Fuca			
August 14-27			
Port	Transit	Transit	Port
Aug 13-15 16		Aug 26 27-29	

Crews

Zephyr surface: Chris S, Roman, Nilo, Cheri

June 5-9 Flyer: Chris S, Jim, Doug, Scott, Brent, Gene, Chris P., Roman, Julie, (Vrijenhoek), summer student

August 15-27 Flyer: Chris S., Doug, Scott, Brent, Chris P.

Other Items:

- Van is level and external power connections finished. Still must be wired internally.
- Chris S and Julie at CMORE in Hawaii next week; gone March 15-19.
- Jim will be gone at ASTID reviews March 30-April 3.

14May2009

This page last changed on May 18, 2009 by [jbirch](#).

Present: Scott, Brent, Doug, Jim, Gene

Absent: Chris S., Cheri, Addie, Wayne

Machine Builds

MFB

Drifter

- Pre-Flyer cruise dive days on the Zephyr have been pushed back to May 26 and May 28
- Gene will be in Test Tank Monday/Tuesday
- Ordering radar reflector. Have blinky light. PPP is running via wire. Scott will set-up Freewave's
- If time, will pull Iridium off an existing surface mooring and mount on Drifter.

Software

- Brent's been working on HP pump. It seems to run either full on or off. Difficult to run it at other than 2000rpm. He has a was to work servo control with this constraint.
- Next is to characterize the differential pressure sensors then
- run sample fluid through the core loop
- Noticed that TSV seems to get off by 7-9 counts when you power cycle. Scott will watch while they try and re-create.
- Discussion about making the laptop on the boat a 'slave' to the shorestation, so missions can be started right on the boat (boat laptop->~~shore station~~->ESP buoy) instead of having to rely on someone on the shore.

Deep ESP

- Will talk to Science about needs for a metal wand to withstand high temperatures at Axial. Otherwise, with current design, the end of the 'wand' is actually a solenoid valve.
- Doug showed valve design to Brent and explained function.
- Must get Science buy-in about wand idea, but in the meantime we will push forward with this design.

GUI

Deployment Issues

- Two potential sites to visit in June:
- #1. 2900m [36.61N, 122.44W]. Flat, open, clear water. Nearby clam-field.
- #2. 1800m [36.71N, 122.1W]. Flat, poorer visibility. very old whale-fall.
- Much discussion of which site. Consensus was that August cruise is most critical (depths of 1400-1600m), thus site #2 would provide adequate testing for August without undue risk.
- A very rough deployment schedule was discussed. Leave MBARI @ 11am on Friday, June 5, return Tuesday, June 9. Chris and I will meet with ship crew 10am (Tank View) Tuesday to discuss.
- 4K ISUS mtg Tuesday @ 11--Tank View. Will meet with Luke, John R., and science.

Other Items:

15Jan2009

This page last changed on Jan 21, 2009 by [jbirch](#).

Present: Jim, Wayne, Brent, Doug, Scott
Absent: Chris S., Cheri, Addie (maternity)

Machine Builds

-

MFB

-

Software

- Wayne can make the bits w/ his version 10.1 tools
- Brent mentioned syringe loses home position periodically, so Wayne will apply similar testing that he's done to rotary valves
- Next week will start work on dpress and ethernet extenders for Drifter
- Bufflehead is now on an UPS as is MFB01
- Brent has finished calibration code for R-valves
- Latest version of Ruby patch code is MBARI17. Will test on Moe. We are using Ruby 1.6.8 with this latest patch code (new Ruby is 1.8.7)

DWSM

Sphere

- Sphere passed vacuum leak testing
- Packed for SWRI and will be sent tomorrow (Friday)

Elevator

- Mike P. working on drawings
- John Erickson doing some acceleration models of the structure
- Foam--Trellenberg (TX) is having manufacturing issues with 30lb foam. Doug looking into alternatives

DWSM

- Scott and Wayne have got software/electronics to the point of turning motors
- Mike P. handling small job issues
- Now are dicussing cable lengths for elevator
- We will use FOCE's connector cable, but final connector for MARS will be different.

GUI Development

-

Other Items:

-

This page last changed on Oct 16, 2009 by [jbirch](#).

Present: Cheri, Doug, Brent, Jim

Absent: Chris S., Scott

Machine Builds

- Scott provided rough [board prices](#). Numbers and invoice sent to Mike Pinto to bill McLane. Money to be returned to 900915.
- Most recent drawings for screens are here--> [SH1 screen](#) and [WCR screen](#).

MFB

Drifter

Software

- Both Moe and Bruce have thrown errors on the processing side where valve/syringe loses it's position. Brent doesn't think it's mechanical but rather a timing issue between the firmware and the FPGA. Gordon shows no problem but is running the newest firmware
- Must find out what version of CPLD code and firmware is on each machine.

Deep ESP/DWSM

- Weathered out of the Oct 13 pickup of Gordon (D-ESP). Next available Lobos day is Oct 27.

GUI

Deployment Issues

- Radio at Abes and at Brents are getting flakey due to introduced water. We will try butyl rubber tape to get us through this networked deployment. Boxes should be made for future deployments.

Other Items

- Pier deployment
 - - Brent measuring and ordering 2 boxes to contain electronics (and radio). should be in mid-next week
 - Brent and Doug checking out Pier tomorrow; where to mount things and water height at low tide.

16Apr2009

This page last changed on Apr 16, 2009 by [jbirch](#).

Present: Cheri, Wayne, Scott, Brent, Doug, Chris S, Jim, Gene

Absent: Scott, Addie

Machine Builds

- Rec'd 50um frits from Chand Eisenmann and it looks like they tested the thickness to our old (thinner) dimensions. Chris S. will take and check with Roman to see if we need to return.
- The new harmonic drive on Gordon is working very well.
 - Today Cheri will move fluids then
 - 2 days of temperature calibrations then
 - science testing
- Two additional harmonic drives to arrive end of April. These for Betty and Moe (where we'll replace the hybrid GG hand)

MFB

- We currently have 3 modules from LLNL:
- #1 is on NEO. #3 is on Moe. Just Received #4. All are running firmware version 4.03
- Much worry about how tightly heater boards are being held-should check before putting in water to make sure they haven't shaken free.

Drifter

- Many COTS parts arriving. Lebus Core should be in this week. Surlyn buoy in. level wind motor shipped on April 9. Level wind gearhead shipping April 17.
- No core will be used in any May cruise.
- Will be using stitch-weld can with soft line
- Gene needs Scott/Brent help with network configuration to route packets correctly. We should start testing on desktop ASAP in order to be ready to use this on June cruise.
- Will try and move May 18 day to later in the week so not so close to May 14 cruise.

Software

- Wayne to load new bits for CPLD into DWSM this afternoon.
- We will modify the ethernet driver in the Linux kernel and put on **GORDON** to get it tested before Axial. **This will occur the week of April 27.**
- Brent ordered wireless dongles; we want to speak to the core with no cables--set to occur for the June Flyer cruise.

Deep ESP

- Doug thinks elevator may be light, thus the mis-match with how many blocks of foam we needed.
- 4' sling was best lift length for ship's crew
- O-Ring pinch. In future will use star-pattern of tightening. Ideas for 3rd, gas compression groove discussed.
- Brent getting DWSM set up for development work with Scott on Friday.

GUI

- work continues. After June cruise and NOAA visit, will go to a new log file format. So currently we will exercise new log code in **Gordon**.

Deployment Issues

- For April 23 deployment, plan is to close sphere Tuesday, April 21 at 2pm. This may slip but must be started Weds morning. Science will have all reagents loaded by Monday AM for the next two dives.

Other Items:

- Still to be done: Acoustic modem needs: Reset capability & external power& drop weight. Brent will check on modem voltage range. Brent & Doug will confer about this.

16Jul2009

This page last changed on Jul 23, 2009 by [jbirch](#).

Short meeting.

Decided to heat entire sphere. This will be easier to build/control, and have positive impact on reagents as well as mechanicals.

Firmware Merger:

v 3.51 is on GG and MFB2

v3.54 is latest version will go on GG and MFB2. GG is a low-risk start.

Brent to give a brown-bag on how to configure servo motors.

Pressure sensors are in queue to ship Aug 24.

Most parts for DWSM HP sampler are in and Doug is beginning construction.

16Jun2009

This page last changed on Jun 16, 2009 by [jbirch](#).

Topic: Is Axial cruise (Aug 16-26) tenable given what we've learned during recent Flyer cruise?

Present: Chris, Jim, Scott, Doug, Brent

Discussion as to whether 7 weeks is enough time to address issues in the '[punch list](#)', and test D-ESP sufficiently for a successful deployment.

General idea is that it would be possible, but very difficult, and would jeopardize the Oct 1 MARS deployment.

Decision is that July 6 we will start having weekly check-in mtgs to make sure we are on track for a stress-free MARS deployment.

19Feb2009

This page last changed on Feb 19, 2009 by [jbirch](#).

Present: Jim, Brent, Doug, Wayne, Cheri, Chris S.

Absent: Scott, Addie (maternity)

Machine Builds

- Ivory from McLane arrives Monday for final week of ESP core assembly.
- modification on high-volume puck are finished. Doug has turned over to Chris and they are now waiting to be tested.
- Must order more scintered frits. Jim will take care of.
- PUCK ETCHING
 - Brent has info from a company for bar-coding pucks. Jim can investigate.
 - El Camino may be able to etch future pucks while in lathe. Check with Mike Parker.
 - our next puck order will include many more high-volume pucks. We need an inventory of all pucks ; how many of what types?
 - soon we will lose 2 cores: 1 to SC, 1 to WHOI, and each will take a set of pucks out of our inventory.

MFB

- shop is slammed with work. Cheri coordinating with Mike about getting final 3 sets of MFB parts finished before shipping to McLane

Software

- Brent has been able to scrounge cables and laptops.
- Ruby control of DWSM has begun
- NEO code vs. all other cores:
 - - AIV valve: it's very easy to change ports on valves, but not easy to change what channel the valve is on.
 - - Decision is to keep NEO in 'lab-mode' until Chris P gets through her testing, but then upgrade to make compliant with other cores.
- IRIDIUM modem on drifter. Is Gene using same modem as on MOOS? If so, no problem.
- dPress board review next weds @ 10am.

DWSM

Sphere

- Still in parking deck. Will be moved to tin-shed by facilities people.
- Doug to look into purchase of a (folding?) engine hoist for moving stuff within the van.
- Doug has designed center spider hanger cage for holding ESP core within the sphere. Parts to get to the shop today.

Elevator

- We've decided the modem to purchase (w/ deckbox). Will cost \$27K. Will charge to 900915.99. 10-week lead time, although this isn't needed until June.
- Because of g-loads during a drop, Doug has done some mod's to the design and will work on some Jeep-Bumper-like landing feet.
- Foam coming in tomorrow or early next week. Will be machined down the street at a boat shop 🚧
- We need an ESP stencil to mark the foam

DWSM

- Bad pump has been sent back and will be repaired/replaced.
- Scott/Doug discovered they can't get enough power through the motor controller
 - might got to two power supplies in series
 - Scott working on board to make this work
 - Brent should be cc'd on all this correspondence.

- Doug predicts that they should be pushing water and oil by middle of next week.

Other Items:

- Refrigerated van has been ordered and will arrive next Tues/Weds (Feb 24/25). Call had gone in to Greg Voogd about setting up electrical hook-up. We will wait for Danny Day to do wiring, using extension cords if necessary for lighting. Once van here, we'll convene on where wiring/lights should be installed.
- Chris S. wants a NASA sticker on the side of the van
- Science deployment on Zephyr, April 1.
 - - Will deploy BRUCE
 - Team will be: Roman M: lead, Chris P: scripts & mission planning, John Ryan: ISUS, Cheri and Wayne will work comms and mooring mechanics, Jose: batteries.
 - Before this deployment, we will switch over to locked version of the new code. Recently Bruce has been run with new code (off the network), but still has last deployment code locally. Brent will today load new code on locally, so much exercise can occur before April 1 deployment.
- Self-organizing TWIC teams are forming. Wayne, Chris S, and Scott are going up together.
- Teams need to be decided for two Flyer deployments: June 5-9 and Aug 15-27. Look at ship schedules to get exact dates. We want to arrive the day before the MOB day, and figure on returning home the day after reaching port.

19Mar2009

This page last changed on Mar 19, 2009 by [jbirch](#).

Present: Cheri, Wayne, Scott, Brent, Doug, Chris S, Jim, Gene

Absent: Kevin, Addie

Machine Builds

- Scintered frits to arrive March 25. Chris S. says no problem as they will not be used in April 1 deployment.
- Cold-rated 25ml syringe leaks when at 4C. GG's DID work at 4C so we could try it. Scott playing phone-tag back and forth with company.
- New CPLD code has been loaded into MACK; it will get 'exercised' by engineering while we fiddle with the core...

MFB

- MFB's rec'd at McLane. Ivory is checking them out. No word on build dates.
- LLNL contacted about their first delivery of modules (supposedly on the 20th).

Drifter

- Decision is to use Freewave modems. Will use our current radio box, which also contains GPS
- Foam arrives 1st week of April. THEN we can start superstructure build.
- Cable drum is taking time to build. Will be ready late March/early April.
- Currently electronics are giving problems--fried UART? Gene to work with Wayne. He also needs ME Tech time.

Software

- Brent still to get the PCR module version to LLNL.
- we now have 50GB on the ESPShare--should last 1 year.
- Bruce seems to be running fine as a local machine (since Monday)

Deep ESP

Sphere

- Paul C and Tom M are currently wiring sphere bottom

Elevator

- elevator fits sphere
- feet still to be installed
- foam being added to top today/tomorrow
- drop weight assembly still to be designed and manufactured
- Acoustic acoutrements on elevator: We'll use a pinger (we'll borrow, unless we want a more powerful one than we can borrow; then we'll buy), and another for data-transfer and release.

DWSM

- Doug able to manually create 4500psi on repaired pump. It is now installed into DWSM
- hold-up on DWSM is wiring the switch assembly; Scott to get etechs on this
- Doug has lots of loose ends to finish
- dPress CPLD; faults because switches are not 'sticky'. Wayne thinks it's software and will fix today. There have been some mechanical problems getting the switches to switch.
- Ruby code for DWSM. Brent will write something that will perform the tests we want to perform for this first deployment. Doug and he will talk mon/tues; we'll have a group mtg Weds to discuss the finalized testing.

GUI

- Comments from Kevin:
 - Rich and I sat down at got back working on the ESP log changes. We checked out the most recent code and got everything building and are generating missions with the GUI and running them on Rich's machine (in simulation). We are now looking back at the previous code changes Rich made and migrating them to the new code base to meet our needs for log entries. Brian is working on ESP image analysis. He has been focusing on Fourier-Mellin Transform (essentially FFT cross-correlation in log-polar space) but is not convinced it will work for the spot images. He's implemented the polar and log-polar transforms for images though, which will be useful for other image-registration techniques. He is exploring another method that looks more promising now ...

Deployment Issues

- April 1 Surface. Roman will test radio
- New batteries already installed for GPS.
- Monday mooring will be moved to high bay. Much discussion about checking the radio and radio-link to Abe's house. Brent and Scott have a plan that will minimize Brent's time yet test all systems before deployment.
- Brent fixed our shore station at Abe's house by replacing their power supply wall wart.
- For the engineering test dives for D-ESP, we need to set up target sites for all dives. First one (April 7) will be 800-900m near MARS.
- Chris Grech has some operational questions related to the northern expedition RE: getting equipment up there and what people will need. Clague responded and Chris S. will forward that response to the team for further comment.

Other Items:

- Discussion about ethernet hub in van. Will probably mount a 5-port hub on the wall. Still being discussed.
- Wayne, Scott, Chris S gone next Tuesday for TWIC card #1 visit.
- Northern expedition will require us to truck up our van, loaded with all our stuff. Logistics for this should be contemplated.

20Aug2009

This page last changed on Aug 21, 2009 by [jbirch](#).

Present: Jim, Wayne, Brent, Cheri, Scott

Machine Builds

- Brent needs radio pieces that he can't find since the WF cruise. Gene may know where they are.
- ESP's are not Wi-Fi capable, but will work only on the boats. Issues with MBARI's firewall make it difficult to use wirelessly here on shore.
- Brent discussed some difficulties we will have trying to modem connect to both ESP's and the vertical profiler's. May require some radio switching from point-to-point to point-to-multipoint.

MFB

- Issues with one of the PCR modules MAY be related to poor heater film connection plug. Chris P will test (with Cheri's help) and if not resolved, we'll switch to another module.
- Build of the final 4 MFB's should be complete by Sept 4.
- Chris P. may need MFB protocol change.

Drifter

- work will not begin on drifter tension control until after McStar is deployed (Sep 29).

Software

- MFB2 has latest firmware; must still be loaded on MFB3
- Gordon working well with the latest firmware and GUI code, but still needs extensive exercising.

Deep ESP/DWSM

- Pressure transducers are supposed to arrive Monday.
- Scott adding another thermostat to the heater ring which may provide finer control of in-ball temp's
- Brent pushing for gas-infused liquid (i.e., club soda) testing to see how DWSM handles large amt of boil-off.

GUI

Deployment Issues

- Sept 24 triple deployment. Moe at M0, Bruce at Santa Cruz, and Mack in 16m of water only 5-7m deep. Will need to adjust mooring for that one.
- Sep 30 is MARS. Brent has to give talk that evening so may not be on ship unless guaranteed to be back early.

Other Items

- Jim will handle Abe's renewal for using his house for radio access. Same as last year; \$599 for 1 year of use of his cable modem setup and for allowing us to mount an antenna on his house.

Machine Builds

- Bruce has been run a lot and can't reproduce the processing error
- Seems to be an accumulation of something in the software (27May-happening-on-Neo-during deployment-more evidence it's software and not dwarf)
- HANDS
 - Gordon's goes at 50% force (old ones worked at 30%)
 - Betty taking 70% but with new frame works better than Gordon.

MFB

Drifter

- Test tank tomorrow (Friday).
- Dive days moved to 27 and 28 next week. Likely will only use the 27th.
- There will be no tension control on winch for June dive.
- Pressure transducer and moxa need mounting on lid
 - need fitting and adaptor using power port on lid
 - Mike P to make bracket for MOXA
 - Roman to move mooring to high bay; Jim to get Ken Smith batteries
- Gene wants ESP 100lbs negative. Will work with Mike to accomplish.
- BRUCE is going in drifter

Software

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Deep ESP

- Wand; don't have cables long enough for long wand assembly. Cables arrive 29th (too late)
- Will shoot for a 3' stubby. Code still to be developed
- TSV--needed tightening
- CPLD code works but needs testing
- Mink is soldered and waiting for modem before potting.
- D-ESP cleaning
 - Doug has two 4" sections that can't be cleaned with toxicant. So idea is to add a filter puck taht we push tox through the core to clean both those lines in DWSM, then go to next SH1 run.

GUI

- Will be loaded on Gordon and Betty for beta testing.

Deployment Issues

For June:

- Mack in sphere
- Bruce in Drifter
- Moe on bench

September/October Mack and Bruce 2009

* See attachments for deployment calendar

* If the code needs to be tweaked to use the V2 ctd or one surface ESP will not have a CTD

* we need larger battery pack for ISUS to get high density sampling endurance

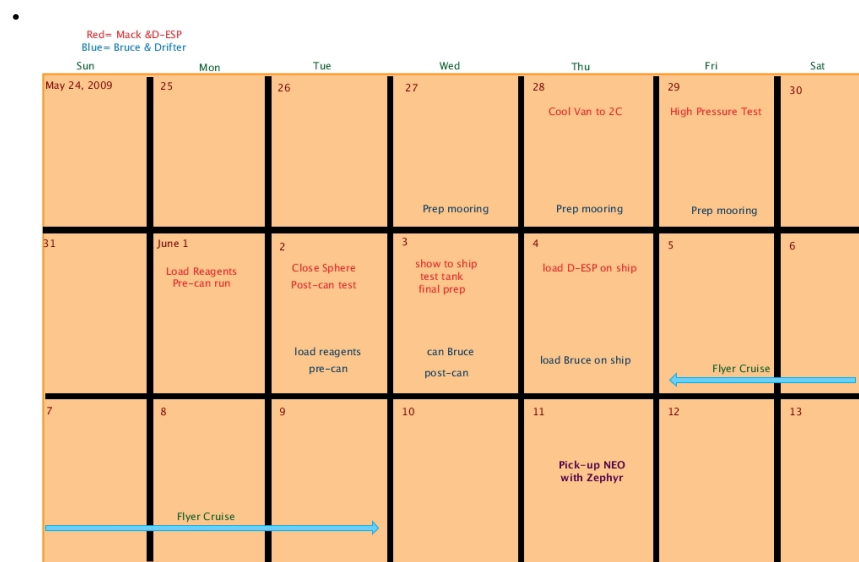
* need to get dry and wet weight of drifter base before I put it back to standard

* ESP and Iridium batteries

Other Items:

- need loaner computer from IS for summer student (Cheri will put in request with IS for what we need)

Here is the schedule for the next two weeks:



- 09may27=> There is water in one of the floats on the bail of the base used for the drifter. Need to check and drain before a shallow deployment of that base.

22Jan2009

This page last changed on Jan 22, 2009 by [jbirch](#).

Present: Chris S., Jim, Kevin, Brent, Doug, Wayne, Scott

Absent: Addie (maternity), Cheri

Machine Builds

- Weeks of Feb 8 and Feb 23 are on for the McLane core builds. Chris S. will confirm with Tim.

MFB

- Cheri will be finished with core kitting by Friday. Then its on to MFB kitting. Goal is to send to McLane by Feb 8. McLane will do tubing cutting. We will update this schedule the 1st week of Feb.

Software

- New Ruby patch (R7) has checked out on Moe. Next Thursday will install on Mack/Bruce/Neo.
- Brent's Ruby patches have been adopted by the gods of Ruby, the Japanese. (This is a big deal, that he should bring to his 2009 review!)
- New puck handling code will be installed with the R7 patch. Now the hand will move a little closer to the pucks when positioned over the carousel to make sure the hand closes on the puck.
- Brent is modifying the log file formats so less CPU time is spent parsing the date /time stamps. He explains this [here](#).
- It was decided that Rich Schramm, working in the Ruby data-management end of things will create branches in CVS, checkout code and test and then merge back in. Kevin will direct this.
- Wayne has found Dwarf code problem. He's getting different checksum numbers, depending on his build platform. He and Brent will devise some tests to determine where problem lies.

DWSM

Sphere

- Doug has created PO for SWRI
- Will ask Cindy to organize trip to SWRI

Elevator

- Mike P. still working on drawings, but unknown progress
- John Erickson still analyzing frame, but coming up with screwy numbers; model may be wrong.
- FOAM: Trellenberg being difficult and now saying delivery is March 30-April3. We have several workaround options:
 - Mike Conway says they (DMO) have 12 ft³ (or more) of 34lb foam we may be able to use
 - This amount may only allow 4 batteries and maybe no CTD
 - Could supplement with glass spheres, but there is a 6-8 wk lead and possible redesign of float housing to accommodate.
 - DECISION:
 - Will use 'Mike' foam and supplement with FOCE foam or use some of Ken Smith's 40lb foam.
- Modem on elevator: nice to have so we can ping without having ROV to plug in. Deck boxes; who has them--we may need to purchase.

DWSM

- Have been running pumps and looks like we will be able to get 6000psi out of them.
- Intake exhaust is running--energy draw is within design limits
- CABLES--critical path issue. 8 week lead time from Seaconn; Scott trying to push them, especially on terminations, but they are rigid in time estimate. Unclear if the 8 weeks is with or without terminations. Will keep checking in with them.

Other Items:

- For March and April sphere deployments, we will use MACK. In May will decide which core to mount with PCR.
- Chris thinking about purchase of 4000m Spectra line for better positioning of D-ESP during deployment. Question is whether winch on Flyer can handle the heave loads, yet to be calculated.
- We need both Teflon retainers and snap O-rings. Science wants the manufacture/drawing #'s for these. Will attend to when we all return.
- Chris has found the High Volume pucks. Doug has good idea for easy modification. When we return, will start process for ordering 20um, 10um, and 0.1um scintered frits. these will be tested in spring/summer surface deployments.
- We need new types of battery connectors on surface can lids. Scott to scope options.

Jim gone to ASLO tomorrow Jan-23 thru Feb 2.

Chris S., Chris P., Brent, Scott heading to LabAutomation in Palm Springs 1-23 thru Jan 28.

Chris S. leading meeting (gathering) next Thursday.

This page last changed on Oct 22, 2009 by [jbirch](#).

Present: Cheri, Doug, Brent (phone), Jim, Scott, Chris S., Chris P., Roman

Machine Builds

- Betty finished and ready for science checkout.

MFB

Drifter

Software

Deep ESP/DWSM

- Deep recovery is next Tuesday, Oct 27. Doug will be only one going on Lobos. Once back in high-bay, will connect ethernet and empty ~15L of water from DWSM bags. Also bringing back Niskines (4L) with MARS water. Chris P., will be around for processing.
- Wednesday we'll crack the ball, remove Gordon and take to assembly lab, and let Brent play with puck handling to try and recreate error we saw. DWSM will go to the van. That evening or the next day Chris P. will remove WCR pucks for processing.

GUI

Deployment Issues

- Surface recovery. Slated for Weds/Thurs next week (Oct 28/29), will get 2 machines Weds, 1 Thursday. Paul Ban is 1 diver; need 1 more.
- Gene has need for a surface can; can get one Friday, but a lid issue. We'll see which can be spared.
- Chris S. mentioned checking Wattlo's to calculate total power consumption while out
- All cans will end in High-Bay where we'll run post-deployment negatives. John's been notified.

Other Items

- Pier deployment
 - Post-can QC of NEO got started late, so will not head to Pier until 12:30. Doug to drive instrument in van. Roman, Chris P & S, Scott going, will meet Brent. We should be running this afternoon.
- Ivory Engstrom visiting from McLane next Weds (10-28)
 - McLanes building of a core is bringing many issues to the fore;
 - Camera: USB2.0 vs1.0. We will develop a controller to stand b/w camera and host
 - Various other issues will be discussed Weds with him.
- Harbans Dhadwal visit
 - Arrives Friday; we will have MFB8 ready for him, but also MFB2 as a 'demo' unit.
- 2010 Zephyr schedule
 - We have 7 Zephyr days sprinkled April -- Nov. All look okay except for last; Chris will try and get Nov 18 moved to Nov 1.
- Marcia goodbye part is Thursday Oct 29; Chris needs to attend. Jim will be at LLNL for McLane/LLNL/Spyglass mtg.

This page last changed on Jul 23, 2009 by [jbirch](#).

Present: Kevin, Wayne, Jim, Doug, Brent, Cheri, Chris S., Scott

Machine Builds

- Cores/MFB's:
 1. MFB#2 goes on Betty. Thermally calibrated; working on slug positioning
 2. MFB#3 goes on Gordon. Monika wrassling with to get it to work....
 3. MFB#4 and #5 are from McLane. Notice very sticky syringes. Cheri trying to whip them into shape.
 4. Betty and Gordon are finished with cold-testing.
 5. Moe is ready for the new box Jim S. has built. Box should be ready today. Cheri has few connectors to add to box top.
- Gordon and Betty both need new CBV lines.
- Brent mentioned problem Monika having w/ re-setting of valve; Scott will look into it.
- Chris interested in another board spin/population to sell to McLane. Looks like boards (spin, stuffed, tested?) are Core=\$6K, MFB=\$1.5K

MFB

Drifter

Software

- Gordon to get the new GUI branch of software next week. Brent to talk to Monika. Perhaps they'll unhook MFB#3 and run a test protocol just to give Kevin some data. This should happen early/mid next week.

Deep ESP/DWSM

- PISSer
 - Doug building. Should be finished early next week.

GUI

Deployment Issues

- Sept 24 is next big surface deployment. Moe w/PCR will go at M0. Mack and Bruce, doing HAB work will be in the north Bay--locations to be determined by John Ryan. Slight move of antenna at Abe's house should hit M0 and north Bay. Will attend to when we know of n. bay location. Priority list is as follows:
 1. Moe at M0
 2. Betty on MARS
 3. Bruce and Mack in N. Bay
 4. Gordon on Pier deployment

Other Items

Present: Wayne, Cheri, Kevin, Jim, Doug, Scott, Chris S

Machine Builds

- CBV/AIV line length is incorrect and must be changed on Betty and Gordon. Was changed on Moe, but core function never checked afterward. This issue still needs to be checked on NEO.
- Currently:
 - Gordon--has MFB attached but MFB running as a stand-alone. Easy to merge when ready but currently Monika using MFB and core can be run separately.
 - Betty--needs thermal calibration. Much discussion about appropriate cold test to do, and idea is to go to -5C, after blowing all fluid out of Burkerts with dry N2. Idea is to test hand, carousel, clamps, elevator, but NOT run valves or syringes.
 - Eventually Betty needs extended chemistry tests at 2C. To do this we need to build larger box (rectangle) to accommodate MFB on the core. This box must have access door.
 - MOE--needs rectangle box, because Julie is ready for cold testing of PCR. Moe also needs temp calibration.

MFB

- John Dzenitis (LLNL) is on vacation until 6-30. After that they will deliver 5 modules (7-6). Must confirm with them our total order of 12 modules with 8 spare heater elements.

Drifter

- Drifter review this afternoon @ 1pm.

Software

- Wayne taking a class at UC-B and has small class project. He is developing a Dwarf replacement; worried about power consumption, but looks like it may be only 20-30% higher than current dwarf, but with much more memory space. Wayne will talk to Scott and Brent about specifics, but class project is a go.
- Brent going to move the GUI branch onto the main branch, and then put the GUI code onto Gordon for exercise.
- Some concern as to why AIV calibration always seems to be 180degrees off. Brent wants to understand this and is on his to-do list.
- Syringe/sign inversion
 - very difficult to duplicate in the lab so it's hard to study. One idea is that a bit gets set wrong that determines polarity. We currently don't have a way to query bit-state. We could take existing dwarf code and add debug ability, and it may let us see what's going on. Much discussion about what re-writing CPLD code and/or dwarf code might entail. Could be a time-sink; Scott/Brent/Wayne will get together on it.
 - Discussion on whether we can have an error check/recovery that fixes this when it happens. Difficult, but Scott/Brent/Wayne to discuss.

Deep ESP/DWSM

- Benthos modem issue. Boards ordered to replicate Hans Thomas' junction box will not work with the newer Benthos Universal Deck box. Jim working with Hans and Benthos to see if there is an electronic solution to problem.
- GG is going into ball to allow DWSM testing.
- Drop Wt--finished designing mechanism, and will wait on manufacture/mounting.
- Acoustic modem--not needed on MARS
- Toxicant bag--low on priority list for MARS deployment
- DWSM
 - pressure transducers
 - a few will do simultaneous analog and serial output
 - must work to 2C, but most are not super cold-rated

- Doug needs to know how we will read them. Talk to Scott
- pricey (\$2500/ea)
- still getting lead times
- PISSER
 - schematic has been revised. Doug wants it reviewed before starts building.
- Overpressure valves
 - how will we read the contacts from the these valves?
 - will change current overpressure valves to larger ones we have on-hand.

GUI

- Kevin working with Chris P to incorporate ESP parameters into GUI

Deployment Issues

Other Items

This page last changed on Mar 04, 2009 by [jbirch](#).

Present: Jim, Brent, Doug, Wayne, Cheri, Chris S., Scott
Absent: Addie (maternity)

Machine Builds

- Cores: A big thanks to Cheri for all her hard work these last 4 weeks preparing and then leading the build effort while McLane was here.
 - On Gordon and Betty:
 - all mechanical systems built, wired, and plumbed
 - all, that is, except the hands
 - discovered discrepancies on both Prunella and El Camino orders; some issues are the drawings, some are their work
 - we will be using one old, one new harmonic drive for the hands
 - R-valves. 6 of 35 boards were bad. Dick had these marked in the Project Library, but Cheri didn't know about that spreadsheet.
- HV pucks. seems to be working well; got a nice array from 4L of fluid. If it works well for invertebrates, we might modify some of our SH1 pucks to test before we place a new puck order. Chris S. working on this.
- We need screens by end of April/May deployments. Science will inventory rings and screens so we can place new order.
- WAG: scope hardening of ESP to 200m = 1 year.
-

MFB

- Mike has finished SPE heater modifications. Only need PCR tubing to ship to McLane.

Software

- dPress code ready for testing. Wayne will load Monday AM
- Brent not started on DWSM yet.

Deep ESP

- ISUS
 - Luk says they have a 4km housing; just need a new probe--a PO away.
 - We WILL NOT put ISUS on elevator in June
 - John Ryan is taking over ISUS work. We may eventually want a TI housing. Craig Okuda may have one for us (or a design)

Sphere

- Spider construction. All parts are machine shop. Will be finished today.
- Frank F. will do welding week after next in the high-bay. We'll have to get the sphere bottom out of its crate for that.

Elevator

- Still 3 weeks out. They had to send it out to be heat treated as their facility wasn't big enough.
- Modem. Because of where Clague will want to go while at Axial, we will probably NOT be within 2km of our drop site (which is required w/ a 60degree modem). Doug thinks we should change to low frequency modem--still working on power calculations, but seems we will buy a Low Freq omnidirectional model.
- Will purchase for the Flyer June deployment--must order in the next 2 weeks.
- Foam. being cut. ready in 2 weeks \$1400.

DWSM

- Sample bags and switches are made

- We may not have stirrer motors in both bags by April.
- Bags are being assembled
- Oil & water not being pushed yet-~~still having Jose make interface boards~~-should be finished early next week.

Other Items:

- Van: Doug has provided sketch of outlets (16) and lights to Greg Voogd
 - we will push ESP to front of van and build a false wall so only front needs cooling
 - Idea to put foldable desks (like Murphy tables)
 - Need to check with Chris Grech about powering the van on UNOLS ships--what do we need?
 - Greg will level the van next week.
 - We need to figure out ventilation issues (i.e., false doors, screen doors, louvers, etc). Check w/ Ussler's van--how does he ventilate?
- Shallow ESP lids --need modification. Original P1 connector is a threaded thing that is breaking. Needs re-machining. Scott will handle.
- Potential Institute-wide chemical inspection--should have MSDS for all chemicals in Bldg A & B labs.

26Mar2009

This page last changed on Apr 06, 2009 by [jbirch](#).

Present: Cheri, Wayne, Scott, Brent, Doug, Chris S, Jim, Gene

Absent: Kevin, Addie

Machine Builds

- We will use GG syring in Mack. May only evacuate if DWSM does the pushes so should be okay.
- Gordon and Betty. Cheri originally send end of March for their completion, but schedule has slipped.
- Betty's elevator, syringe, and carousal are calibrated equal to Gordon.
- The new harmonic drives take 50% motor force to just get going (old took 20-30%). New mount is good, but this drive has more stiction.
- Brent mentioned that there's a stiction parametr that's changeable
- We will try stiction parameters at different voltages. Maybe try different motor manufacturers. Get more Maxon's?

MFB

Our third module should arrive Monday, March 30.from LLNL. Notes related to it are [here](#).

Drifter

- UART fixed.
- Foam arrives 1st week of April. THEN we can start superstructure build.
- Cable drum is still behind schedule.
- Everything bolted and both motors turning (level-winder and cable drum)
- Plenty of little things to do
- May 14 looking tight; waiting on core and gearhead for levelwind. If these don't come, we'll test with the temp core and rope
- Gene must get Freewave. Gene will give his RS232 and antenna needs to Scott.

Software

- Brent still to get the PCR module version to LLNL.
- we now have 50GB on the ESPShare--should last 1 year.
- Bruce seems to be running fine as a local machine (since Monday)

Deep ESP

Sphere

- wiring is complete

Elevator

- we will use Rover drop weight
- elevator feet still to be mounted
- Mike Conway says they have a pinger for us and manual release.

DWSM

- wiring is finished.
- Brent worried about I2C length

GUI

Deployment Issues

- 2 bugs found in Bruce before it's surface deployment. Brent thinks fixes are straightforward & working with Roman on it.
- Looks like HAB antibody has ahd something pushed into it (maybe ruined).

Other Items:

- Acoustic modem needs: Reset capability & external power& drop weight. Brent will check on modem voltage range. Brent & Doug will confer about this.

This page last changed on May 28, 2009 by [jbirch](#).

Present: Wayne, Cheri, Gene, Kevin, Jim, Doug, Scott
Absent: Addie, Chris S.

Machine Builds

- History: At end of last surface deployment with Bruce, near end of mission, PS and PC started losing position and going in wrong direction.
 - Upon recovery, Cheri ran several hundred PS/PC moves and the error never repeated.
 - Yesterday NEO (deployed) showed exact same error. Cheri will watch; not enough time to have Brent dig into this issue.
 - Cheri will check to see what bit version Bruce has (may not have the latest)
- Scott discovered dwarf/r-valve issue (1K resistor used instead of 100K); Dwarfs in DWSM/D-ESP have already been changed. This is a problem in ALL ESP's, but unclear if it results in errors we see on Bruce and NEO.
- PC and CC springs on Bruce have been replaced. Cheri noticed CC temp sensor needed replacement and is doing thermal calibration today.
- While temperature calibrating, will finish build of Gordon and Betty's hands. Both should be installed by end of today.

MFB

- PCR module #07 has arrived.

Drifter

- Much discussion about whether Drifter will be ready for a core next week on Flyer cruise. Many possible failure modes that we haven't had time to fully test. Examples:
 - lose control of cable and core goes too deep and gets crushed.
 - what if we can't respool? How to recover with 200m of line out.
 - safety stop once core is pulled under buoy. Breaking off the termination would not be a good thing.
 - loss of communication; this state still needs to be coded
- Gene thinks that many of these problems will have fixes by next week, and thus having a core in the can for DAYTIME deployments would be an acceptable risk. He is VERY uncomfortable leaving it through the night when we cannot watch it. Much discussion ensued and we needed Science input (chris!!!). But the general consensus was one of high anxiety at the lack of testing of software control, and of core communications through same modem as Drifter control. For that reason, we decided to go with an empty can/mooring, wired with pressure and accelerometer. Scott will work with Mike P on preparing the can, lid, and mooring.

Software

- Looks like changes to the dPress CPLD are working well.

Deep ESP/DWSM

- Brent working on software.
- High Pressure test for DWSM leaks is tomorrow. Doug working out how to tighten bells with minimum fuss. Van will be cooled to 2C tonight, bells tightened tomorrow AM, and pressure raised to 3000psi at the intake port. Minimum test is to see if anything leaks in upper bells. may try and move valves.

GUI

- Will be loaded on Gordon and Betty for beta testing.

Deployment Issues

For June:

- Mack in sphere
- empty can on Drifter
- Moe on bench (and Bruce?)

Other Items

2010 Deployments

This page last changed on Jan 04, 2011 by [jbirch](#).

These are deployments during 2010 arranged chronologically (colors are same deployment)

April 2, 2010. So. Cal beginning. No PCR. Simply HAB and HAB-DA assays.

Bruce (water = 55m): was dragged about 50m, and ended up about 5m deeper than deployed.
33° 35' 02.1"
118° 2' 05.7"

Mack (water = 30m)
33° 36' 19.8"
118° 01' 08.7"

April 29 Recover Bruce. Blowing. **April 30**, recover Mack.

April 14 Deploy NEO w/PCR. Introduced water next day. several recoveries weathered out. Finally recovered **April 22**.

May 4. Deploy Moe w/PCR to M0. Start of leapfrog series.

May 25. Recovered Moe and replaced with NEO. This cruise filmed by Melancon. This was 'hot-swap' cruise.

June 15. Recovered NEO and replaced with MOE. This was a 'hot-swap' cruise; can, orange battery boxes, ISUS battery, CTD battery, and GPS batteries all replaced. mooring and anchor/bungees were re-used.

Pressure problems developed; MOE recovered Jun 23. Discovered pooched o-rings.

July 22-28; Western Flyer Cruise with D-ESP; Gordon and PCR at Methane Mound (33.799, -118.647).

August 3; Deploy NEO at M0 with tombstone PCR

August 30; Recover NEO from M0

September 14 -- deploy drifter (Mack, no PCR) off Western Flyer

September 19 -- recover drifter

September 28 -- Triple deployment-MOE @ M0-- w/PCR, ISUS. 121 54.11 E; 36 50.10 N. 72m water depth

September 29 -- Bruce @ offshore (SC) with LISST, no PCR, no ISUS. Using saline EtOH as preservative. 36 53.75 -122 2.75. 52m water depth. Weight measurements are [HERE](#).

September 28 -- Mack @ bight -- no ISUS. no PCR; Using RNALater as preservative. 36 55.95 -121 55.35. 19m water depth. (Lat/Long are from Aaron Gregg after deployment.)

Nov 3 -- recover all three. Moe ran out of battery on/around Oct 28.

Nov 30 -- Deploy D-ESP on MARS. Gordon w/ PCR. Reagents/mission for 2 month deployment.

Dec 2 (4pm) lost network connectivity. 48V current went from 3A to 0A; isolation relay triggered, cutting off ethernet. 375V continues powering heater.

Dec 6 -- 375V current has dropped to zero. Ball is dead.

Dec 8 -- 10:30am, somehow ESPMars rebooted. temp 5.5C when rebooted.

Dec 9 -- 2:30pm. Restarted mission.

Dec 23 -- lost communications soon after 6:20pm. 375V stopped drawing on Dec 28.

Jan 4, 2011-- Recover D-ESP from MARS

Weight Calculations for BRUCE

This page last changed on Sep 27, 2010 by [jbirch](#).

Triple Deployment Sept 28-Nov 3

Weight calcs as follows:

All in lbs		diff	
Mooring wt (can & anchor) in air	1314		
Mooring wt w/anchor in water	1205	109	
Can weight in air	754		
Anchor wt in air (1314-754)	560		
Anchor wt in water (560-109)	451		
Mooring wt (can & anchor) in water	297		
Buoyancy of mooring (451-297)	154		

2010 Meeting Notes

This page last changed on Oct 04, 2010 by [jbirch](#).

1. [Science Meetings](#)
2. [Engineering Meetings](#)
3. [Software Development Meetings](#)

Engineering Meetings

This page last changed on Dec 21, 2010 by [jbirch](#).

2010

1. [Jan 28](#)
2. [Feb 4](#)
3. Feb 11
4. Feb 18 - All-day CANON mtg
5. Feb 25 - Oceans Mtg (Portland)
6. [Mar 4](#)
7. Mar 11 - Jim at ASU. Scott ran mtg.
8. [Mar 18](#)
9. Mar 25 -- loading moorings on Shana Rae for trip south
10. Apr 1 -- deploy in S. Cal
11. [Apr 8](#)
12. Apr 15
13. Apr 22
14. Apr 29
15. [May 6](#)
16. [May 13](#)
17. [May 20](#)
18. [May 27](#)
19. June 3
20. June 10
21. [June 17](#)
22. June 24 -- Scott led
23. July 1 -- Doug led
24. [July 8](#)
25. Jul 15 --Preparation for Methane cruise
26. Jul 22 --Methane cruise
27. Jul 29 --Methane cruise
28. [Aug 5](#)
29. [Aug 12](#)
30. [Aug 19](#)
31. [Aug 26](#)
32. [Sep 2](#)
33. [Sep 9](#) --CANON cruise, Scholin in England
34. [Sep 16](#)
35. Sep 12 --prep for triple deployment
36. [Sep 30](#)
37. [Oct 7](#)
38. Oct 14
39. Oct 21
40. Oct 28 --Chris S @ WHOI, Jim at Pices
41. [Nov 4](#)
42. [Dec 2](#)
43. [Dec 9](#)

Engineering mtg

Present: Birch, Jensen, Pargett, Preston, Gomes, Radochonski, Everlove

Absent: Scholin, Roman, Marin

Issues

A. Spare Boards

- They are starting to arrive. Cheri noticed that testing rigs taken to McLane don't work for one of the tests with this latest version of Ruby. That test needs a little fiddling with the gains. She will work with Scott to fix that, then come up with a testing schedule that brings Paul Coenen into the loop to do some of this board check-out.

B. Benthos Deck Box

- Doug sent out an all-hands request to look for our missing deckbox. No response. We are checking with Benthos to make sure they shipped us the returned box, after we returned their loaner. Person to do that at Benthos is not in until Monday, so waiting.

C. Machine Blackout Covers

- We do not need anymore. McLane my, and Cheri will put the manufacturer in touch to see. Scott brought up point that covers are actually covering up a broken item. The light seal should work, but doesn't, so that's why we need the curtain. We should fix, but this item remains low priority.

D. ISMS

- it was finally delivered to Harvard, but it's unclear whether Girguis actually has it or not. Wayne sent plans, and they were supposed to re-do the wiring harness and get the instrument back to us by end of April. Looks doubtful. Wayne will be point of contact and also get dimensions of housing so Doug can start designing mounting hardware.

E. D-ESP

- Drop weight tested, is good, and can be mounted.
- New bulkhead valves are in
- pressure transducers will ship April 27
- Sample-side is back together and Doug has been testing it daily. It has yet to fail.
- will change gears and transducers when they come in, and be ready for Brent to tweak when he returns
- Have Bill Ussler as a 'featured speaker' at our April 20 Science meeting to discuss deployment on the methane mound. We may need to increase our sampling tube length (max of 15m).

F. Surface Can Lids

- Neo's current lid is populated from SC pier deployment; never been leak tested.
- Cheri will leak test and put older, leak tested lid from Moe onto NEO.

Aug 12

This page last changed on Aug 12, 2010 by [jbirch](#).

Present: Brent, Jim, Scott, Chris S.

Absent: everyone else....

Issues:

McLane joined us via phone for first part of meeting.

- Learned that host board we sent was only 8MB, and would not work for them. Although we typically use 16MB boards, the smaller boards should have worked. They are ordering 16MB board and will have it shipped to us. Brent to check it out.
- Camera issues. New cameras have pixel shift in bottom 2-3 rows of pixels. powering on/off usually removes this. Much more testing needs to be done to approve the newer cameras. MBARI (Brent) will do this testing, to begin as soon as we receive the host board from them. Scott has ideas on how to supply 12V power to the newer cameras. Once we get the board, anticipate 1 week of testing.
- We'd like to piggy-back on the temperature sensor board order McLane is about to make. Order 10 boards; 5 stuffed, 5 PCB's. Also 20 backing mounts for these boards.
- We will notify Ivory of the blue-wire fix for the ESD problem Scott discovered on Betty.

Machines

Bruce

Has new firmware, but there are issues with calibration. Tina using currently--will try and squeeze in b/w her runs and recalibrate (Scott).

Mack

currently on Drifter. Just learned it has loose PSV, and was blowing out WCR, so nothing collected. Still needs firmware update.

MOE

has latest firmware (v3.7).

still has pressure issues--several issues:* pressure gauge changes over time; possible PEEK creep causing it. we will turn down gain to increase the head space of the gauges

- snap pucks come apart
 - clamp isn't strong enough. Scott to talk to Doug about spring change. Also will run clamp w/ heat to see if PEEK changes more.

NEO

currently in water at M0. will get latest firmware when recovered (Aug 30)

Must decide what Science wants to do with NEO. Will there be a pier deployment in Oct/Nov, and do we rid NEO of the tombstone and replace with an MFB and the attendant firmware upgrades, so all cores will be running the same thing? Discuss this at next Tuesday's science mtg.

Gordon

Still in the ball. Chris P. hopes to be finished with post-cruise QC runs by Monday.

Betty

still not ready for science checkout. Pressure issues among others.

Communications for BIOSPACE

Question is whether one antenna on Brent's house can hit both the bight and the shadow ESP position. Plan is for him to get a wider angle antenna (not omni) and shoot it down the middle, or almost so, and try and hit both positions. Has a sailing friend who heads out every Weds who can take some radio gear and go to each GPS coordinate and see if Brent can ping the boat from his home.

This page last changed on Aug 19, 2010 by [jbirch](#).

Present: Brent, Jim, Scott, Doug, Chris P, Roman, John R., Julie

Absent: Chris S.

Announcements:

1. OTIC kick-off meetings will be Nov 11 and Jan 13. Clem Furlong and the UW crew will be here both days. Laurie Connell and Greg Doucette will come in Jan. Annette handling travel/lodging arrangements.
2. Quick review of where to charge hours. Most work is now going on .00 sub-projects, except for occasional things Doug P is doing. Email went out detailing who charges what. If you weren't notified and you need to charge SURF Center, time goes on 900915 or 900913. Check with Jim.

Issues:

- John R brought the LISST for show-and-tell, and discuss mounting options on one of the surface moorings (bight or shadow) during BIOSPACE. Looks like it will fit in the ISUS position with relatively little modification. Doug to get diameter before John sends back for calibration, John to get in-water weight and collect battery housing.
- Strain Relief. The strain relief on the can end of drifter appears to have failed. It again appears to be a manufacturing flaw. Scott thinks it will make it through tomorrow's deployment, but should be replaced before CANON cruise. Jim will check with Dale/Scholfield whether there is time to reterminate before CANON. We will use the recently rec'd new strain relief and again send this one back.
- Brent rec'd the 8MB board from McLane, and the 16MB they had ordered and shipped here. He quickly ascertained the problem and notified Ivory, who is on vacation until next week. This episode has Brent believing he needs better access to their network; things can be fixed from here, instead of fed-exing back and forth.
- New camera testing. Images look good, but anything coarser than 2x2 binning will show a pixel shift, due possibly to our slow processor. Chris P and Roman said 4x4 binning no longer used, so this is moot point. Brent will do a cold test, but this new camera (Starlight model 'R') is looking good.
- Pressure issues: Thanks to work of chris P., we have settled on pressures that 'work': **55 psi for SH1, 40 psi for WCR**. All machines will be changed to these, and Doug is looking at the availability of springs that, instead of being 2x current strength, may be only 1.3-1.4x. Increasing spring strength has consequences of ball screw selection and connection to the motor. All permutations being evaluated. We need to get this info to McLane as soon as we see how stiffer springs function.
- Cheri's computers. Will back-up her desktop harddrive, then use that machine as a replacement for Bufflehead. Her laptop (with Solidworks) will remain in lab (probably with Roman).
- MARS wet-mate connector being worked on. Scott thinks 10' section is long enough; will discuss with ROV pilots before formally placing order.

Machines

Bruce

Tina's assays were not working. Roman ran several from 2008; they worked perfectly. thought was something in the filter media could be causing issue. But then Roman ran more of Tina's this morning and it worked. We will continue to run Bruce up until BioSPACE to ascertain the problem.

Mack

Mack is working. Connector on PSV seems no longer flakey, and with the lowered puck pressures and recalibrated pressure sensors, we are ready to can today, mounting on Drifter tomorrow AM. Roman taking out tomorrow for 3rd test.

MOE

Ready for running. MOE should get the very latest software, which was a check to keep heaters from heating to temperatures that could never be reached.

NEO

currently in water at M0. will get latest firmware when recovered (Aug 30)

Must decide what Science wants to do with NEO. Will there be a pier deployment in Oct/Nov, and do we rid NEO of the tombstone and replace with an MFB and the attendant firmware upgrades, so all cores will be running the same thing? Discuss this at next Tuesday's science mtg.

Gordon

Still in the ball.

Betty

may become testbed for clamp spring testing.

Communications for BIOSPACE

Scott heading to Abe's house next Tuesday (Aug 24) give him his 2010/2011 check, and oversee the antenna post install for this new antenna. He'll call Abe and antenna guy on Monday to confirm.

This page last changed on Aug 26, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, Chris P, Chris S.

Absent: Brent, Roman, Julie

Announcements:

1. Bruce Kiefer arriving Sept 13-Oct 2, to learn end-to-end deployment procedures. Don Peters from EOM also coming for a day to observe.
2. Vanessa here from Aug 30 to Sept 20
3. Liz O. will be here in Sept for cruise 

Issues:

- Pressure issues on all cores.
 - We believe we've found the problem, which seemed to have become exacerbated when we added the larger o-ring in the PEEK. This gave the puck more surface area to 'push back' on the clamp, and we were operating near the capacity of the springs, thus the pucks would leak/not hold pressure. The fix is relatively simple. Doug has chosen some springs to 'double-up' above and below the puck, and we will go to a softer aluminum coupling b/w motor and ball screw. This pressure issue is only an issue with the fine porosity filters, which are not used in HAB operation, so it is not a critical path issue for McLane, although something they will be notified about.
 - Moe will go through it's final check-out next week, and if the current SH1 and WCR pressures work, we will not exchange any springs until after the BIOSPACE deployment.
- E/M cables.
 - We currently have 2 'long' and 3 'short' EM cables:
 - LONG
 - one 22m cable is currently on Drifer
 - one 20m cable has an incipient bird-cage near the middle (6m) and needs the bending strain relief (BSR) repaired.
 - SHORT
 - two 15m cables (currently one is deployed w/ NEO, one is here at MBARI)
 - one has end cut off to fix BSR
 - We must repair one (to have 5 cables); Scott will decide Monday after talking to Gene/Paul.
 - **We need to purchase more cable this winter.**
- ISUS
 - Drawings for ISUS 4K housing are finished and have been checked by Ray (thanks Doug).
 - Will have a meeting with Ken Johnson and Luke to approve.
 - Also need to discuss what equipment SURF has and wants them to build, so we only need to tap the Johnson group once/year for calibrations.
 - Meeting slated for Tuesday, Aug 31, 11am.
 - Must also figure out how to power ISUS. Using ESP batteries saves us from \$15K battery housing, but does it run off a power converter?
- Spares
 - Unknown what spares we have and/or where things are located in the lab. Waiting for Roman to return from vacation and we will do major reorganization, and possible re-order of parts, in particular spare PTV and CTV's.
- Antenna at Abe's house has not been mounted, as it did not arrive on Monday. Scott will work next week to schedule another time. Unlikely to work mounted on fascia.
- MARS wet-mate connector PO (#**1011191**) approved today.

Machines

Bruce

Scott and Jim worked on PTV, finding that it does not hold pressure. Found an old used PTV; disassembled, both look similar. We swapped rotors and are pressure testing this combination over the weekend.

Mack

All reagents are on (except HAB/DA). Chris will run WCR/Bac/WCR with runs through the weekend. Monday is puck-fest. Load them on Tuesday, can on Weds and give to Gene on Thurs/Friday. That is also the day of the post-can QC. Drifter gets loaded on Weds, Sep 8. Chris to assemble materials to keep Mack cool.

MOE

Scott fixed broken traces on collection temp sensor. Chris doing series of runs over weekend, getting ready for Julie handoff.

NEO

currently in water at M0. will get latest firmware when recovered (Aug 30). Jim and Scott to get Monday am. 6:30 for 7:00.

Gordon

Still in the ball.

Betty

no report.

Aug 5

This page last changed on Aug 05, 2010 by [jbirch](#).

Present: Chris P., Brent, Jim, Scott, Julie, Wayne, Gene, Roman, Chris S.

Absent: Doug P.

Issues:

1. Drifter cruise #2 has been moved from Aug 6 (tomorrow) to Aug 12 due to pressure and leakage issues of Mack. If Mack gets fixed, canning will take place next Tuesday.
2. Scott and Roman working to understand how/why pressure gauges moving out of calibration so much. Brent to run check on all machines to see what is going on with other pressure gauges. Scott to give Iridium tracker to Thom Maughin for integration onto Drifter buoy.
3. The patch Brent pushed down to NEO out at M0 is working. It has successfully run through 3 WCR with no evac issues.
4. Brent has been contacted by Ivory; WHOI wants to communicate with their ESP using Iridium. Transferring TIFF's will be very expensive. Should we perform a JPEG conversion? NO. Will go to 4x4 size and stay with TIFF's so data is still available in images.
5. Scott had good idea to build socket for small board for addition of ESD resistors on dwarfs.
6. MOE will get new software next week. Should be ready for science Aug 16.

Notes:

1. As decreed by Don Anderson at WHOI and approve by all involved parties, the first commercial ESP instrument has been renamed ESPChris in honor of Scholin.
2. We will keep Cheri's laptop to run Solidworks, and one of her desktop machines will be reassigned to Roman. All others will be returned to the I.S. pool.
3. Newly ordered D-ESP CTD scheduled to arrive August 30.
4. Meeting next week with Kevin, Brian, Rich, Brent, Chris P, Roman, and Chris S. to discuss start of WHOI-MRI grant and software needed. Date/time still to be determined.

Engineering meeting

Items:

- In 2011, we may swap a Zephyr day (May 19) to later and use Shana Rae on the 19th.
- Much discussion about the ship schedule in 2011.

Teledyne may become more involved in the engineering process with G3. We will get an NDA and MOU in place and possible host them at a mid/late Jan/Feb meeting. Chris going to visit them and see if they are interested in participating.

G3

- A system level diagram showing concepts needed.
- We should start from G2; e.g., 40 samples over 3 weeks would be a good minimum
- what about looking at sampling workshop output for sampling requirements? Chris S. will look to John R. to get this together. See what potential users want to do.

MARS

We may move the recovery day from Jan 31 to later in that week.

Adaptive Sampling We will run the algorithm on shore and then push the 'decision' to the instrument. Brent to work on it this deployment.

Maybe use temperature as signal ; 3 runs when temp drops, 3 when temp rises, 3 when mid temp. Should stay simple if code is not ready

We need to retain 8 samples in reserve for this. Terminate mission the end of the first week of Jan. Must push a patch down to DWSM as we think a compliance bag is broken.

G2

Super-Clamp is on only Gordon right now. We have coaxial alignment pieces, but still need springs. Doug to order.

This page last changed on Dec 09, 2010 by [jbirch](#).

Present: Brent, Scott, Doug, Jim, Chris S.

Items:

D-ESP

1. Batteries are now charged after its miraculous recovery. Drawing 2amps. Usually draws 1 to 2, but we will move ahead. Current limit on MARS now set for 15A (D-ESP peaked at 10.5A before death).
2. Do we turn on ISMS? After discussion, we will let D-ESP run a phase, then turn on ISMS (which could be late tomorrow or next week). Potential recovery day Jan 2, 3, or 4.
3. Chris P. should make her 'water request' to the Lobos.

Surface

1. Scott has met with ROV pilots and handed off the design and building of the battery sled to them. Will order 1 more ODI connector (for a total of 4) so we have a spare.

• **Announcements**

- Scott and Jim will attend one day of exhibits at ALA Jan 29. Will get Cindy to work out logistics.
- Jim meeting Pete Girguis at AGU next Weds. Given that the fundamental question of the JdF cruise is how it might provide a window into microbial populations given certain environmental conditions, what are the details we need from him? Suggestions:
 - - Possible locations? Go to most important first.
 - Temperatures and depths?
 - Mass Spec
 - Can it be turned off and on to run again?
 - What power cycling scheme is possible?
 - How will/how much power reduction will we have by JdF?
 - What are defaults if we can't move the D-ESP given a top speed of 0.2knts while ROV is under water at depth.
 - Issues from Chris P:
 - Capture probes and frozen cells for the bacterioplankton he wants detect on the array. Sooner the better. I'll be starting testing of some new deep captures in early Jan. and can fold his in
 - We have to have in OUR hands his assay condition, primers and probes for loading on Gordon on April 25.

D-ESP

DWSM

- Doug opened sample can and all switches work just fine 🙄 Much discussion about what to do now. Doug wants to re-build bag assembly, but uncertain how that would help identify the problem. Difficult to know the path forward. Brent/Scott/Doug to meet and discuss.
- Doug's found new sphere Bulkhead valves (\$80/ea) and will order 4-5 to replace current (leaky) ones.
- ROV pilots and Craig Dawe working on a dead vehicle recovery option so they could get ROV back if attached to D-ESP while it's hooked to MARS and the ROV dies.
- Doug has no information on the Mass Spec housing (see below)
- Drop weight release needed modifications: design now almost finished, then to machine shop.

Mass Spectrometer

- we are experiencing scope creep. Were supposed to receive a turn-key system to mount on elevator, and what Wayne has rec'd still needs wiring work and power supply filters, and currently will not turn on. Also Doug has no specs on the housing
- Jim will set-up another phone conference with Pete to address these issues

Surface ESP's

- Bruce has been turned back to 2008--firmware and Ruby scripts. Some temperature calibrations were out of wack; Cheri did a quick room/hot temp calibration, so those numbers have changed, but everything else is the same. Ready for Roman to start running DA arrays.
- Mack has latest firmware and is running off the networked (not internal) code.
- Betty needs new Linux OS and Ruby Interpreter; for it's month long test run, should NOT run off network as it will hang each time the network goes down.
- All machines need the latest software components (Gordon is only one with all of these)
 - Dwarf Firmware (update to 3.68)
 - Ruby Script updates
 - Linux OS update (from 1.6 to 1.8)
 - Ruby interpreter update to 1.6.8-`mbari8B`
- Brent will work with Cheri to start this process and then hand-off so she may finish the upgrades on all machines.
- Scott will create *machine-specific pages in JIRA bug tracker to follow the software version numbers on each machine.*
- Brent sent this email 2-3-2010:

There's a bit of an ESP configuration conundrum we should discuss. I have had logic in each machine's `configuration.rb` file that automatically configures out MFB support AND the core's AIV rotary valve if it has no MFB dwarf installed as determined by probing for the MFB dwarf on the I2C bus.

The intent was to allow the cores to automatically recognize the presence (or absence) of an MFB and adapt their configs appropriately. But, this approach is proving not to work well for two reasons:

- 1) If the MFB is removed from an ESP, it is no longer possible to rotate its AIV valve (which is controlled by the collection dwarf) because it assumed to be always associated with an MFB.
- 2) In simulation, all dwarves appear to be installed. So, ESPs always simulate as if MFBs are installed.

I'm considering ditching this automatic probing for the MFB dwarf and requiring that each machine's `configure.rb` be modified explicitly to exclude the AIV and to include MFB support as needed.

Decision was to **remove** the auto-detect feature.

- Brent, Kevin, Jim, and Todd Ruston will meet to discuss setting up a CVS account for McLane to get the latest Ruby code.

Plans

S. California network deployment

Chris still pinging on them for:

- site visit
- Depth, site, boat information
- pier set-up

Methane seeps in July

--Going to the NE Santa Monica mound. 807m ~10-15m above seafloor. 100m across, 50m wide on top. Currents are 10cm/sec on top of mound.

5.25C

Must pick-up McStar sometime during cruise.

Also will have 4 gulper samplers--2 on swing arm, 2 on porch.

Much discussion on hydrate spontaneously forming and how it may impact DWSM.

Actions:

- Can we mimic hydrate formation in lab? unlikely.
- What are our contingencies if we form hydrate plug? Exhaust the intake tube from the back side?
- We could send a sample system down in March and see if you get hydrate formation.

Lab Stuff

Code:

- Gordon/Betty running the same firmware/software
- NEO -- super old stuff
- Bruce/Mack--running older stuff, but they are even different from each other (although that diff is small; could be just in the WCR protocol script)
- Moe--unknown what it has, as code has not been checked back into CVS in a long time

Plan:

Roll Bruce back to Oct, 2008 code and recreate a good DA run.

Push Mack forward so it's running Gordon/Betty code and see if that fixes sign inversion error.

Upgrade firmware on Moe to the latest.

Cheri will be helping with all this.

--

Methane cruise

1. The team has performed an amazing job dealing with issues as they arise, and the sphere is closed, tested, and almost ready to go. Some issues about the heater in the ball, and how it has not ever been calibrated, but we believe it will be plenty warm enough, especially when plugged into the ROV.
2. The final science test in Gordon will be July 15, a core negative which will finish on July 16.
3. Elevator has been Test Tank tested and needs ISMS/CTD testing once more (tomorrow). Zincs to be put on ISMS housing. Acoustic modem needs new batteries.
4. Mike Conway working on placing tie-downs in the van. Flat-bed arrives/load/leaves MBARI July 19, and will get to LA harbor around midnight. Generator to power van arrived yesterday; Scott working with Day electric to get correct connector. Unknown how long fuel tank will power generator (trucking company does not know).

KUDOS to Doug and Scott for handling the lion's share of D-ESP preparation for travel.

M0 Flip

1. We will be deploying NEO on August 3, recovery TBD, possibly with Shana Rae. Roman will lead this deployment, remaining crew TBD.

Drifter

1. Gene has 3 drifter days planned: July 12, July 23, August 6. The first will be using empty, good (not stitch-weld) can. Second and third deployments will have MACK and each will probably run one complete phase. MACK currently needs some hand adjustments to ready it for a massive Tina McKlusky workout August 9-16. Roman will be working on this with Cheri.

Visitors:

1. Vanessa  from U. Georgia. August 1-31, then returning for BIOSPACE, Sept 28. She will be optimizing PCR assays.
2. Liz Ottesen. Here now, working to optimize (decrease) the amount of time needed to fix samples, once collected.
3. Tina McKluskey from Doucette Lab. She will be creating standard curves for DA on Bruce & Mack, Aug 9-16, in preparation for BIOSPACE.

I think the above are correct. apologies for mis-statements or misspellings.

June 17

This page last changed on Jun 17, 2010 by [jbirch](#).

Present: Chris P., Doug, Brent, Jim, Scott, Cheri, Julie, Sara, Sunni, Wayne

Absent: Chris S., Roman

Issues:

1. NONE!

Methane cruise

ISMS

1. Wayne and Sunni have wrestled the beast into submission these past 2 days, and are waiting on new o-rings to seal up the instrument. They will Can, Test, replace membrane, and be ready to go. Doug will take housing early next week for elevator build.
2. Slight issue with getting turbo pumps up to speed, but Sunni says this is normal--keep sending them 'go' commands and they eventually get going.
3. We will turn ISMS on once it reaches the bottom, and not turn it off until it a.)runs out of battery, or b.)mission ends.

DWM

1. Replaced IEP pump with the smaller one and now it (inexplicably) is working.
2. Plan is to exercise the sampling today, and sometime this weekend run a full day phase at temperature and pressure. Sunday will turn off the van and allow a slow warm-up. Will cut-out and SPE parts of the phase to spare the column of potential inhibitory effects of rust. Doug will then get it Monday to begin the elevator build. Scott and Jim to get more foam from Castroville this PM.
3. Logistics:
Advance team will be Doug P., Brent, and Chris P., who will fly to LA on July 20, meet van, and fire off deck phase. They will spend evening in hotel arranged by Theresa C.
Rest of team arrives July 21; shove off July 22.

Scott is travel contact person week of June 21. DougP. contact person week of June 28. Jim takes back over week of July 5.

M0 Flip

1. Lowering bubble-point pressure to 60PSI has worked and Moe has now made it through 4(!) WCR's. Brent thought issue to look at was the raw counts of the pressure gauge while puck is in clamp and there was no pressure and while it was holding pressure. This would tell us if sensor is reaching it's limit due to wrong gains/offsets. Julie going to look at gathering that data.

Engineering mtg

Present: Birch, Jensen, Roman, Pargett, Preston, Marin, Gomes

Absent: Scholin, Everlove

S. California

1. Trip-planning

- Paul Dimeo of the Aquarium of the Pacific has been put in touch with Kim Reisenbechler RE: divers. Should have this nailed down by early next week.
- Scott contacted by George and Hai of OCSD. Apparently they needed proof of insurance and liability before allowing us on the roof. they've been directed to Pinto so we are good to go when we recover the antenna. They've made a request for one of them to attend the deployment. Would be very good politically to take one out with us.
- Coast Guard has told Mike Kelly we do NOT need a Notice to Mariners; there are already so many moorings out in that area that we are covered under one or more. Just let them know when we recover.
- We will load on Shana Rae, Thursday, March 25 at 10am. Jim will email Jim this info.
- E/M cables; both fabricated, now to start testing. Float material is being machined. Scott figuring out float spacing.
- new anchor line to arrive by March 24.

Deployment:

- Team will be Roman, Scott, Jim. Brent will be available via phone for troubleshooting (he leaves 9pm April 2)
- Still deciding best way to get equipment down to Newport Beach, but will leave Weds, March 31, load boat and deploy Apr 1, return to MBARI Apr 2.
- Will build a full dress of mooring in high bay before disassembling, so we know we have everything when we arrive down south.

Other issues

A. Betty and hand problem

- hand still flaking and trouble-shooting is in stasis while Cheri in Falmouth and we prepare for deployment.

B. Doug--update on DWSM

- There is now power back to the core.
- New switches and ba adsembly in sampling can with serrated clips; hopefully no leaking now.
- Resample side has not been opened, but will open when kevlar gears come in. Then we'll replace switches in bag.
- Bill Ussler has seen DWSM and better understands what we mean when we say we depressurize water. He leaves on cruise tonight to test our wand fixture at the methane mound to see if depressurization causing clogging with precipitating hydrate.
- Need to double-check weights and space on WF. Find out how many hours from port the location is. this will help decide where we should open ball, should we need to.
- Some minor software development needed for wand--Brent/Doug/Scott to talk about before Brent leaves.
- Scott to talk to Pete G. about ISMS issues: batteries he's getting for us, which housing will we be using to mount to elevator. Must still mount computer in the ball.

C. 2G camera issue

- Original Starlight cameras were good
- Then came out with higher speed USB camera (f series) that didn't work with our slower USB
- Now they have the r-speed, which seems to work at older, low speeds, but sometimes there are artifacts; restarting makes them go away.
- If our long term goal is to reduce power, Wayne has found board designed to work at 200mW (vs. 2.5W). We should use him to build a carrier board that would benefit both 2G and 3G systems. This goal is good, but will probably not be addressed until our deployment season is well under way.

D. Spending out of Moore Foundation \$\$

- Doug to get price for portable He leak detector
- Brent to get models/price for 4 HP computers, and old email about a cheap, low power radio to test
- Scott to get prices on 4 batteries and chargers for running cores in the lab.
- any remaining money will buy reagents through Roman and Chris P.

This page last changed on Mar 05, 2010 by [jbirch](#).

Present: Birch, Jensen, Roman, Pargett, Preston, Marin, Everlove, Scholin

Absent: Ryan

S. California

1. Pre-trip: Will be week of March 15.

- Probably Tuesday, March 16. Birch/Jensen/Roman
- Will fly into John Wayne Airport, but waiting to hear answers to many questions from Burt/Matthew.
- Will take Shana Rae. Load mooring gear on Thursday, March 25 in Moss Landing, then drive ESP's down in van on 30th. Load on ship on 31st. Deploy April 1.
- Divers. Looking into using local divers. Doug Conlin has contact with local UCLA group. Brent also has some leads.
- Moorings: Jims Scholfield should have them finished by March 17. Training Paul C. while he makes these two.
- Foam blocks arrive March 29. We will scavenge from exisiting E/M while these blocks are out being machined. Will end with 3 'short' and 2 'longer' E/M cables.
- Batteries arrive March 10 and be assembled by March 17.
- Will need new anchor lines but need to verify depth

Other issues

A. Betty and hand problem

- Betty is not deployable. We cannot recreate the problem (presumed to be a short somewhere) to know where to test/what to replace. Vexing. Will continue to exercise the hand, hoping that use will cause failure....

B. Doug--update on DWSM

- Problem was that we weren't reliably able to see empty or squeeze, so we didn't know when to stop pumping. We could change the code to look for a current increase in the pump, but that's kind of a hack. Doug to test for another week, then power down to allow Scott access to battery box in order to cast a new one.
- Before that, Chris P. will clean Gordon Lines and remove reagents.

C. Cheri--MFB build update

- MFB builds continue. hope is to have all finished before she leaves for Mclane (March 15). MFB distribution list is [here](#).

D. Next MFB training will be week of May 24. Will distribute MFB's in June.

May 13

This page last changed on May 13, 2010 by [jbirch](#).

Present: Jim B., Chris P, Roman M., Wayne R., Cheri E., Brent R., Chris S., Scott J., Doug P.

Absent: Cheri E.

Issues:

1. Benthos Box: Supposedly being shipped today. Should arrive next week. Much testing needs to be done with it and acoustic release, as well as hull transducers on the flyer. Many questions still to answer related to using the acoustic modem on the Flyer.
2. Light seal issues on current cores was not discussed.

Methane cruise

1. Much discussion over puck make-up necessary for this mission and pre-mission testing. [Here](#) is plan as of 13 May 2010.
2. Discussion of schedule once we arrive in LA. Some issues with sharing our van, particularly when we need to run a 'dock' QC before loading on the ship. This issue has been resolved with Theresa.
3. ISUS. Will we use a deep one? Discussion with Bill Ussler has resulted in a negative to that question. Better science may be obtained by collecting water around ESP and running through his GC.
4. Girguis to be called and delivery date confirmed of ISMS and is being shipped to arrive May 19th. Peter changing a turbo pump, and we need to make wiring harness. mounting brackets already finished. Scott has cabling which needs potting.
5. Gas canisters. will check to see if we can pre-load on WF.
6. Doug P created extensive list of to-do items.

M0 Flip

1. Need support engineering help to prep the next 15m of E/M cable for the 25th deployment. Paint and replace floats.
2. Melancon would like to film the canning of NEO and go on the cruise on Tuesday.

May 20

This page last changed on May 20, 2010 by [jbirch](#).

Present: Chris S., Doug, Brent, Jim, Roman

Absent: Chris P., Scott, Cheri, Wayne, Kevin

Issues:

1. Benthos Box: Unknown if it has arrived as of today.
2. Brent has been working with Cheri who is at McLane getting 'Mira' up and running. Various issues (pressure differential and syringe mov't, change time to EST) are causing problems. Brent is helping track down and solve.
3. Must discuss the new HP laptops; are they working for everyone, and do we provide them with the MFB's? **This is a future to-do item.**

Methane cruise

1. Pressure interface has been cleaned and will be tested today.
2. Doug close to installing new bulkhead valves; they needed slight modification, which machine shop has finished.
3. Noted that Chris P. has much on her these next two weeks getting Gordon ready. We will revise her plan for MFB training during the week of the 24th--perhaps bring Julie in to help to give Chris more bandwidth to work on Gordon issues.
4. ESP Van will be temp controlled to ~ 65F starting May 24.
5. Brent wants to meet with Chris P. and finalize the 'day-phase' procedures and figure puck usage.

M0 Flip

1. 22m E/M cable is painted and we re looking for spreadsheet with float locations.
2. batteries on mooring; bungees finished today; tomorrow Roman will finish mooring
3. Checked with Jose, and he'll get E/M cable 'ohmed' out after getting specs from Scott this PM.
4. Roman will be printing arrays all weekend.
5. Chris P and Brent discovered a serious bug in the SH2 protocols that effects all machines, that does not allow recovery if error occurs in a certain specified window. Decision has been made to add a patch to Bruce, Mack, Moe, and NEO.

May 27

This page last changed on May 27, 2010 by [jbirch](#).

Present: Chris P., Doug, Brent, Jim, Scott, Cheri, Julie

Absent: Chris S., Roman

Issues:

1. NONE!

Methane cruise

1. Discussion of what to do if Flyer is out of service. Currently out for month of June to rebuild one engine. Also issue is what if ROV is not usable? We will continue moving forward, as though the deployment will take place, although contingencies will be developed should problems arise. Decision should be made as early as possible in order for people to plan their vacations.
2. Bag limit-switch will be set-up tomorrow. Chris P. starting core testing of Gordon tonight. the MFB run through the standards will take through this weekend. SPE column still needs changing, and Chris to do that Sunday. Will meet with Scholin tomorrow (Friday) to discuss various chemistry issues that Chris P. has been exploring. Chris P. will lean on Julie if/when she needs help.
3. Pressure testing of DWSM is going well. It has been tested to 1600psi and all connections look good.
4. Julie brought up issue that Luke mentioned that our bleach solution in DWSM may have been causing spurious ISUS readings. Discussion was directed at conversing with Luke about how the way we use bleach could not have given the readings ISUS gave.
5. Mass Spec has checked out visually. Wayne to fire it up early next week, and we will mount it in its pressure housing (which has arrived and resides in shipping), and perform dunk test late next week.
6. Modem deck box arrived and it turns on(!). Cables to connect modem are still being made. Discussion ensued over testing just that much of it to make sure it worked the burn wire/drop wt release mechanism, or wait until we got everything together to test. If we wait, and it needs to get sent back to Benthos, we may not have time. We will check this out next week to ascertain how much time/work it will take to do the complete test vs. a short test.

M0 Flip

1. The 'hot-swap' of can and batteries onto the existing surface mooring went very smoothly on Tuesday. MOE is in the high bay now running through it's post-deployment QC. Next flip is scheduled for June 15, and much discussion about moving the next flip date back a week to give Julie more prep time. We must remain cognizant of our power limitations (unlikely we will make it beyond 4 weeks, running PCR). Jim will talk to Grech next week and see what the likelihood of moving our dates will be.
2. Short discussion about keeping the high-bay clean. We all know that...

May 6

This page last changed on May 11, 2010 by [jbirch](#).

Present: Jim B., Chris P, Roman M., Wayne R., Cheri E., Brent R., Julie R., Scott J.

Absent: Chris Scholin, Doug Pargett.

Issues:

1. NEO preparations ball screw has been replaced with new one. Reagents corrected. CTD compatibility to be dealt with on the deck by 'hot-swapping' with one that works on MOE. Pressure differential error: must be the sensor. The two have very different response slopes, so will replace with a new pressure gauge. Discussion ensued on what exactly the logs looked like. Brent to look at the first deployment log. **We must look at temperature effects on pressure gauges.**
2. CTD's: One must be sent back to Seabird and therefore will be returned with the newer firmware. We must get Bob Herlein to do work.
3. Roman to disassemble and do forensics on Bruce and Mack. Start Monday.
4. Cheri to visit McLane May 17.
5. Methane Mound cruise is gelling. A. Load WF July 21; shove off July 22
B. begin return to Moss Landing July 27; arrive July 28
LOCATION: a. WF will be in Los Angeles Harbor, Berth 262 near Wharf and Tuna: [WF location](#)
b. Discussion ensued; we will use Benthos modem. Deckbox should arrive late this week.
c. Will use large Niskine Rosette
d. Get methane mound temperature to run D-ESP van for check-out.

Nov 4

This page last changed on Nov 04, 2010 by [jbirch](#).

Present: Brent, Scott, Doug, Chris P, Elif, Julie, Jim

Absent: Chris S., Bill U., John R. Roman

Items:

1. ISMS slated to arrive next Tuesday (Nov 9).
2. Driver tweak for new CTD (with O2 sensor)--Will start working next week when Roman returns
3. MOE to be opened right after this meeting
4. Gordon preparations. --We are behind in preparing the sphere. MOE currently running a phase outside the ball. Chris will load new reagents today, and Monday we will marry MFB with core and move core to the sphere.

--Will immediately initiate high-pressure testing.

5. Plans for next week's collaborators meetings* ESP team planning meeting next Thursday 10-1

- Thursday. UW. Agenda will have 1hr for MBARI, 1 hr for UW. maybe quick tour.
- Friday. ASU. Tour and then talks

Announcements

- We have rec'd confirmation that the Moore Foundation grant was approved for development of new (smaller, faster) analytical module back ends.
- Announced Mechatronics meeting if publishing engineering papers is desired.

Oct 7

This page last changed on Nov 03, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, Bruce K., Roman, Brent, Chris P

Absent: Chris S., Julie, John R.

Issues:

- Much Discussion on schedule of Gordon and D-ESP Prep. Current calendar is [MARS 2010 Calendar](#).
- Jose working on 48V switch-over for ISMS integration. Must check with him to see what instructions he was left from Scott.
- Need to call Pete about his ISMS plans.
- Brent working rest of year on integration of newer version of Ruby.
- Also wants to develop .JPEG thumbnails, that could be easily sent over Iridium. This has it's drawbacks, as they can't be analyzed, but otherwise 70MB/30-day deployment is too costly using Iridium.
- Roman to work on array printer. We need BAC arrays.
- The new CTD sensor has an Oxygen sensor; means we need to tweak the new driver. Brent working on this.

This page last changed on Sep 16, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, John R., Julie, Bruce K., Chris S. Roman, Brent, John R.

Absent: Chris P, Elif (both CANON cruise)

Issues:

- PUCKS
 - Shana at Spyglass is a little behind in cleaning. We need LAF's and SH1's by Monday. Shana has been notified and will have everything by Friday (tomorrow).
- Does RNA-Later kill DA reagents?
 - Tina and Greg have been working on this and do not think so. Even 1% solution (=strong) does not seem to inhibit the reaction. But they are testing under different atmospheric conditions than would be encountered in the can. Thus, needs can testing. [Chris S. to call Greg and talk about using/not using RNA-Later on the two BioSpace machines, which would provide and in situ empirical test of this hypothesis.](#)
- BIOSPACE DEPLOYMENT.
 - Much discussion about getting water for Vanessa and how we can collect samples for her. Looks like Zephyr will get to M0 twice/day, so arrangements will not be difficult.
 - There is the potential we can deploy all 3 machines in one day. [Scott to talk to Kim R. and Eric about this; also will check with Aaron when Zephyr returns.](#)
 - We have batteries, and Paul setting up for box preparation.
 - Moe at M0, Bruce at Santa Cruz, Mack in bight.
 - Bruce and Moe get canned MONDAY. Radio check then; if problems, Brent in Tuesday to fix.
 - LISST mounting on Bruce under CTD.
 - Monday bases get set up in high-bay.
 - Waiting to hear from Chris P on whether a post-QC run is necessary; we need to get the archives out and stored.
- ISMS
 - ISMS will be on MARS deployment Nov 30, 2010.
 - We plan on Pete doing development to take 48V power.
 - Scott working on mounting web-relay switch.
- D-ESP
 - IEP issues. [Doug ordering new type of piston IEP pump.](#) Waiting on PO approval.
 - Needs to be mechanical adjustment of Gordon's elevator. too close to bottom of SC.
 - **Sphere will be closed NOV 17** for Nov 30 deployment.
 - Much discussion over power requirements for D-ESP on Juan de Fuca next summer. Powering ISMS causing concern. Following are options:
 - get ISMS to power cycle, so it's only 'on' while taking a reading
 - develop new, lower power ISMS (Harvard would do this)
 - have additional battery elevator that would allow battery swapping and recharging on deck.
 - ISMS rides on and is powered by the ROV
 - ISMS carries its own power (Li?).
 - If no ISMS on D-ESP, charging would be greatly shortened, freeing up ROV for other operations.
 - If ISMS on elevator and using D-ESP power, worry is that bad weather, for instance, causes us to leave, and the ISMS will suck batteries dry, killing entire experiment.
 - This will get extensive discussion at AGU when we meet with Pete.
- Clamp re-design
 - all parts are in and we can start testing at any time.
 - currently will run puck evac at lower pressure and see if there are dribbles. This seems most conservative solution, not requiring hardware and minimal software change.
- WHOI spring deployment
 - many, many unknowns about their deployment strategy. Gumby hose to pump surface water down to ESP, as well as surface expression (is it a mooring controller?) and radio comms to shore are all still under development.

- Chris S. to call Don and let him know these issues potentially jeopardize the entire mission.
- Will also check to see whether EOM guys are coming to visit MBARI.
- CTD--Bob Herlien has found the smoking gun in the newer firmware of the CTD's. He will train our software to ignore, and must back test against earlier versions of the CTD. That should be finished next week.

Machines

Bruce

Problem seems to be solved; have repaired the finger temp sensor. 3 good DA runs so far.

Mack

Was deployed around 12:30pm on Sep 14. Glitch at beginning so did not start its mission until 6pm.
Drifter moving SSW ~20cm/sec. Discovered that Drifter data not being logged internally; must have radio contact to see data.

MOE

Vanessa re-running standards over the weekend. Both MOE and Bruce to be canned Monday.

finally...

The Logo for the ESP group has been selected and can be seen [HERE](#).

Sep 2

This page last changed on Sep 09, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, Brent, Chris P., Chris S., Julie

Absent: Roman

Announcements:

1. Elif Demir has joined the ESP team for 6 months. Welcome.
2. Custom Array (Combimetrix) coming tomorrow to talk about collaboration.
3. ESP logo competition begun. We will receive entries until Sep 10. Meet Sep 14 to decide winner.

Issues:

- Pressure issues on all cores.
 - Chris brought up issue that the sampling issue never gave us a problem before, now we're seeing it. Doesn't make sense. We think we have been dancing on the edge of acceptability and have now crossed over . Will continue to retro-fit cores with stiffer springs, and adjust the pressures reached to insure pucks don't pop open when pumped up.
- Antenna at Abe's
 - Brent oversaw the mounting (\$266.00) and antenna is working beautifully. Brent will turn down the power to 250mW (right now running at 1W) to give us a 4W effective.
- Drifter
 - must have mission checkd. Chris S. will look over. Loading pucks today.
 - Tomorrow is a comms check. QC check tomorrow. then power down and sit over the weekend.
 - CANON cruise leaves Sep 9. Drifter deploys Sep 15.
- ISUS Pressure housing
 - some minor changes (MINK fitting and vent port), then sending out for bid.
- DESP
 - Doug working on an IEP replacement. He's testing new configurations, but there is potential problem with encoder.

Machines

Bruce

pressure test inconclusive. Going to run phase with Roman to see if that gives a clue.

Mack

see Drifter above.

MOE

Vanessa ran her standards this week. Julie to run a full-phase to check the new code added.

NEO

is uncanned. CC is salty. Found liquid at bottom of housing. Think it's waste container overflow.

Gordon

Still in the ball.

Betty

no report.

This page last changed on Oct 04, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, Bruce K., Roman, Brent

Absent: Chris S., Chris P, Julie, John R.

Issues:

- BIOSPACE DEPLOYMENT.
 - Deployments went well. All machines around 7m deep. 4-band bungee seems much more stretchy (Bruce at SC site).
 - SC site is 11.5 miles from Abe's house, thus had to use Brent's shore station. 3-6 feet more of antenna would really help.
 - Some discussion of WHOI's idea of radio testing Oct 13-15 when Bruce on cruise
 - Brent set up 'seeds' that all pulling down mid-res images and file copying from instruments to shore stations.
 - **Machines and first day of mission**

Bruce

had problem with SH1. either air in line or blue frit. used lyfill to flush intake, and then retried and it ran it's first SH1. Bruce has old CTD (that used to corrupt HEX files but is working okay right now) and old driver.

Mack

Mack as newer CTD but started with old driver. Miscommunication; thought Mack would have old CTD. Brent pushed down updated code (with new driver). This has not been QC'd...

MOE

first IPC looked good. second failed. Third looked good. Arrays are black. multiple reasons why this could be but bottom line; **not enough QC.**

- D-ESP
 - Parts for new IEP will arrive by next Thursday.
 - Plan:
 - Install IEP **Oct 12**
 - Load Reagents **Oct 21** then begin testing
 - Seal DWSM **Nov 3-4**. High pressure testing during/after.
 - Sphere closed **Nov 17**
 - Brent will need to modify firmware to get pump into dwarf port 
 - Went over Scott's to-do list; he's gone until Oct 25.
 - D-ISUS--when will it be ready? It will run off battery pack, and this Dec we'll use Luke's Al housing. Do they want Ti housings? We need to order.
 - 2 months on this ISUS housing build.
- Bruce K brought up temp issue in GOM. Much discussion, no resolution.

G3 planning

- Team needs as much info as possible before Nov 11,12 requirements meeting. What are goals, who will be presenting, schedule of the day should go to team ASAP.

Sep 9

This page last changed on Sep 09, 2010 by [jbirch](#).

Present: Jim, Scott, Doug, John R., Julie, Vanessa

Absent: Brent, Roman, Chris S. (England), Chris P, Elif (both CANON cruise)

Announcements:

1. Chris Melancon has announced another pending order for an ESP. This is a NOAA contract and will go to the NW Fisheries Science Center in Seattle, WA.
2. Audio track for the D-ESP YouTube movie will be recorded next week. Linda Kuhn on vacation for 2 weeks but will have movie finished soon after her return.

This was short week due to Labor Day (Monday) and an off Friday.

Issues:

- Julie ran full-phase through MOE last night with no glitches. She hopes to have MOE canned for BioSpace on Sep 15; she leaves for vacation Sep 16-Oct10.
- ISUS
 - D-ESP: Luke has a Vicor power supply we can use; we've order him a replacement.
 - NEO: ISUS will be given to John for refurbish and readiness for BioSpace.
- BioSpace ESP deployment is Sep 28, 29. Three machines: MOE w/PCR at M0. Bruce and Mack, both running only HAB, HAB/DA will be in the shadow and the bight. Which/where to be decided next week. Will work with Aaron from Zephyr when they return from CANON to decide how they'd like to do the deployments. LISST machine to go on the mooring that deploys in the shadow.

Machines

Bruce

waiting for Roman.

Mack

is on the WF. they shoved off today at 10:30am for the beginning of the CANON cruise. All ESP systems are a-go!

MOE

Julie has run full-phase, and will run another tonight. No problems.

Gordon

Still in the ball. After checking with Chris P, we have turned off van chiller.

Betty

will be first to get the new, stiffer springs for clamp testing.

This page last changed on Dec 07, 2010 by [jbirch](#).

All dates 2010

1. [Jan 5](#)
2. [Feb 2](#)
3. [Feb 9](#)
4. [Feb 16](#)
5. Feb 23 -- Oceans Mtg., Portland
6. [Mar 2](#)
7. [Mar 9](#)
8. Mar 16 -- Jim in S. Cal scouting. John Ryan ran mtg.
9. Mar 23
10. Mar 30
11. Apr 6 -- canceled in preparation for M0 deployment
12. Apr 13
13. Apr 20
14. Apr 27 --AbSciCon, League City TX
15. [May 4](#)
16. [May 11](#)
17. [May 18](#)
18. [Aug 24](#)
19. [Sep 14](#)
20. [Sep 21](#)
21. Sep 28 -- Network deployment. no mtg
22. Oct 5
23. Oct 12
24. Oct 19
25. Oct 26 -- Chris S. @ WHOI, Jim at PICES
26. [Nov 2](#)
27. [Nov 9](#)
28. [Nov 30](#) --Year re-cap
29. [Dec 7](#) -- Julie gives project update; Bill shows AGU poster draft

Aug 24

This page last changed on Aug 24, 2010 by [jbirch](#).

Present: Chris P., Jim, Chris S., Bill

Absent: Julie, John R., Roman

1. Machine Updates:

- [NEO \(at M0\)](#)
 - had a seg fault error this morning. Chris P restarted. Will see if it makes it to recovery on Monday.
- [Mack](#)
 - Chris tested at new pressures (55psi for SH1, 40psi for WCR), and pucks look good at these pressures. These are what we'll use during the CANON cruise.
 - Gene to get Mack for Drifter installation on Sept 3. Some issues with drifter's batteries; unknown if enough power left to run for 5 days. Plan has always been to run for 3 contiguous days, 5 if we are lucky. Power used in the last 3 one-day test deployments is unknown, so we may purchase fresh batteries for drifter before CANON.
 - Boat (WF) will be loaded late in day Weds, Sept 8. Chris needs tarp and sump pump to keep can cool.
 - There will be a meeting today @ 3pm w/ Duffy to discuss where stuff will go on the ship.
- [MOE](#)
 - Still needs software changes.
 - Scott will integrate MFB1 into MOE
 - Vanessa bck on Monday the 30th and will want to start working with her assays on MOE.
- [Bruce](#)
 - DA testing still messed up. looks like a pressure or passive leak. maybe Scott can look into before Roman gets back?
- [Chris P PCR Paper progress](#)
 - We will meet Tuesday, Sep 7 to generate some momentum

This page last changed on Dec 07, 2010 by [jbirch](#).

Present: Chris P, Elif, John R., Roman, Allison, Bill, Chris, Jim, Julie

Items Discussed:

1. Cold testing

- Viscometer to arrive late this week
- Standard to arrive today.
- Testing Idea:
 1. Building of matrix has begun.
 2. using Wash Buffer with added methanol:

Test Matrix:

Temperature		wash/block alcohol %by v/v			
room	0%	5%	10%	15%	20%
10	0%	5%	10%	15%	20%
4 (or ~2)	0%	5%	10%	15%	20%

- Will look at differences qualitatively, then
- collect viscometer data, then
- test on plates, then move to cold instrument.
-
- Chris P. working on SPedil cold testing. Looks like there are minor changes in pH, depending on precipitation, but unclear if these will have any effect on assay. She will run PCR with calf thymus and various precipitated SPedil and see if there is any change.

2. MFB Plans

- Patty has shipped MFB9 back from Caltech
- Chris P will work on preparing that for Harvard

4. Other issues:

- Will ship McLane pucks back today. Will include some of ours as samples for their machinist.
- Jim will figure out where the next numbering of pucks should begin, for the pucks still to be etched.

Julie presented her results from 2009 field work.

Bill presented his AGU poster.

Feb 16

This page last changed on Feb 17, 2010 by [jbirch](#).

Present: Julie, Chris P., Bill, Jim, Chris S. John

Absent: Roman

1. PCR paper figures.

- here is tentative plan: # Fluidic path of MFB and abridged core diagram
- 1. image of bkgrnd subtracted triplicated standard curve
- 2. table --avg PCR effect
- 3. Lab triple PCR graph
- 4. M0 climatology data
- 5. panel graph of field data and array examples
- 6. AUV data 
- 7. 3-d plot of nitrate/temp/salinity vs. abundance -or- time resolved---3 time plots* Chris will have rough figures at our March 9 meeting.

2. IPC order through Spyglass?

- We will be getting 5000 reactions, (which is 10K for us since we use it at 1/2 dilution), which will be enough to get us through the spring/summer deployments.

3. Precruise for March deployment?

- Charlie will do this. We must do the July one, using same missions as March so pilots know what equipment we want.

4. Progress on '08/'09 paper.

- John just got back and will be working with Roman on keeping paper moving forward. he wants to turn '08 data into cell-counts. May use Diane for this but will first check with Roman to see what his bandwidth looks like.

5. ASLO practice talks. Friday, Feb 19 10:30am-12.

- Moved time back 1/2 hour to accomodate Chris S.

6. Pete & Vik groups schedule. And are they taking instruments back??

Groups getting trained; Pete sent 2 grad students who just want to drive the ESP. Plus a student from Zehr lab, plus Orphan's people. First reactions did not work--might be the master mix.

7. DA testing

- Roman has not been seen to ask what the status of this was. He was busy training Bruce Keafer last week, no no DA testing yet.

8. S. California deployment

- Chris S. working on boat issues. We have prices from Christmann, but need to see what Scott's found. Will finalize by middle of next week.
- New E/M cables are in the queue so we can deploy at 12-15m depth.

Present: Jim, Roman, Chris P, Bill
Absent: Chris S., Julie, John

Papers

John & Roman

- John will combine Sept '07 and Oct '08 data. Currently combing through AUV, DA, and HAB data. Chris P. says all physical data for these deployments is in SigmaPlot and she can show Roman how to access.
- After Betty is up and running, and Bruce Keafer is gone, Roman can hit this full-time.

Chris P./ PCR paper

- Currently picking data out of notebooks, mainly the NEO m0 deployment of May '09 (Nov '08 pulled reagent from wrong valve; data suspect)
- **Next week:** skeleton outline/figure ideas/holes to fill/which journal.
- Chris sent out her summary of the water quality monitoring work in a Jan 17, 2010 email.

Lab Issues

- Chris reading PICARD manual (new PCR machine). waiting for a loaner PC from Zorba who is on vacation.
- Bruce K. arrives Monday
 - Roman will show him how to run ESP--will use Bruce/Mack
 - Shannon Johnson will also shadow
 - Roman needs Cheri to clear Bruce for operation (done 2-4-2010)
- Bruce has had software rolled back to Oct '08 and will rerun the DA assays; should be finished by Tuesday
- Cheri to look into a light-proof curtain wrap around Bruce so we don't miss pictures. Maybe check with Haddock lab on how to do this.
- Next week Girguis sending two grad students and Victoria Orphan sending 1 tech to learn how to run MFB.

Betty

- has a full carousel
- will start mission on Weds
- over weekend it will sleep, then hammer next week (30 min break b/w runs)
- If it fails, we note detailed documentation on how we recover. Cheri needed here.
- Then SCIENCE CHECKOUT; Cheri needs to shadow to learn this for the McLane build checkout.
 - - bag reagents
 - - load them
 - - run tests (projected to take 3 days)
 1. make lysate
 2. make an array
 3. run a phase
- need cell cultures to do this properly; McLane does not have. Might have to work with Bruce at WHOI.

Moe

- waiting for Julie to get back

Gordon

- Looks like PCR reagents are fine when running standards. 1 m/m line had bubble; IPC primer was also pulling funny. Chris found inhibition from normal samples, though.
-

Feb 9

This page last changed on Feb 09, 2010 by [jbirch](#).

Present: Julie, Chris P., Roman, Bill, Jim, Chris S.

1. PCR paper layout. Chris S. will present outline, fig ideas, holes. Discuss which journal to focus it towards.

- Chris started the layout and many decisions still need to be made about how many machines to include in building standard curves, and which deployments. Discussion ensued.
- She will have Figure ideas next Tuesday.

2. M0 leapfrog deployment. Julie, discuss your plan; what are Chris P's, responsibilities in this?

- We need to use only 1 probe set from beginning to end of deployment. MaryAnn from U. Ga, wanted liquid back but that ain't happening. We are still trying to decide which P/P set to use.
- Moe goes out April 15 on Zephyr
- 30 days later, Neo will be flipped for Moe.

3. Do we need new targets for Nov MARS deployment of D-ESP. If yes, must develop libraries?

- **Tabled**

4. Progress on '08/'09 paper. (John returns 2-12)

- **Tabled**

5. ASLO practice talks. I've reserved Pacific Forum Friday, Feb 19 10am-12.

- Everyone is happy and excited to get their talks done the week before and practice them.

6. Gordon Results

- **Tabled**

7. New IPC results?

- We will order 10K rxns from Sandy. (or Melancon if he can deal with large number and has approval to be a reagent reseller from ABI)

8. Pete & Vik groups schedule. And are they taking instruments back??

- They arrive Monday (MBARI Holiday) but have Chris P phone number.
- Vik bringing 5 p/p sets and will use MFB #9
- Pete's group will bring 1 Cyber, 1TAQ assay, will use MFB #2
- Reasonable target to ship them their MFB's is March, 2010 (Vik first, then Pete's group)

9. MOE script upgrade after Julies MOCK deployment? Should new IPC be included on the MOCK??

- Cold testing will begin this week with Moe. Engineering is standing by to help Julie can the instrument.
- Julie will upgrade scripts after the cold test, but before the deployment.
- I don't remember what we decided about including new IPC into the mock deployment

10. DA testing

- We will begin Bruce DA testing next so Roman can watch it. He's working with Bruce K. now and training is going slowly because there is so much to learn. We will be sending Roman out to WHOI to help with acceptance testing.

11. S. California deployment

- Chris S. working on boat issues, looking like we may use Shanna Rae, but haven't heard from Christmann. S. Cal will put two moorings in San Pedro Bay and run Hab/DA/WCR.
- We need to simply set a date and go there, as the guys down south don't know what to tell us on dates.

Various

- We need to begin a list of how to test extraction and archiving protocols that would work the best. This will get more complicated as other groups start adopting our work.

Jan 5

This page last changed on Jan 12, 2010 by [jbirch](#).

Present: Scholin, Robidart, Marin, Ryan, Birch

1. Discussed January schedule of all people.
2. Probe inventory; Roman would look into.
3. Discussion of papers to publish
4. Dry-run of MTC reagent production will be week of Jan 18.
5. Discussion of CMORE meeting (Feb. 1). Must give poster (Julie) and will ship an MFB. Will print-out and bind several MFB manuals (Jim).

Mar 2

This page last changed on Mar 04, 2010 by [jbirch](#).

Present: Chris P., Bill, Jim, Chris S., John, Roman

Absent: Julie

1. Move ESP mtg time to accommodate CANON?

- CANON meets every other Tuesday from 10-11. We will move ESP Science meeting. New time: 9-10am every Tuesday. Surface Commons.

2. Updates:

- Moe is in cold room and Chris will start running while Julie is on vacation this week.
- Puck giving blow-back, which allowed less and less reagent in. Roman has changed code and Bruce has run good DA's. Roman will move that code onto Mack (running latest Ruby) and see. (3-4-10 update: it works!. Will use old DA code in new Ruby machines).
- Array printing. No message from Nilo, so unknown if cavro was installed this weekend. We will start printing with tips we have.
- Gordon reagents. It's set-up so it COULD run, but if we are serious, we should reload. Deemed lower priority given the S. Cal trip coming up.
- We should order more SPE columns. Addie ordered them last, lookup in PO's. We think from company called Column Engineering.

3. MFB Training?

- There will be a training for water quality monitoring people in April after M0 deployment. SCCWRP, USC, MLML will each send 1 person. Stanford maybe 2 people.
- Purpose is introductory MFB training, then a referee session to determine who is doing what.
- Ali Boehm will get a COS post-doc that will come down for training.
- priority list on who gets MFB's is [here](#).

4. DA reagent schedule.

- Chris S to check with Greg about DA production schedule.
- propose to get DA reagents March 23.

5. S. California deployment

- no archiving during this deployment
- will take Shana Rae. Use local divers.
- Discussion ensued about how to move instruments. Decided to have SR pick up mooring material on March 26. We drive two cans down on 30th and mount on 31st for April 1 deployment.

Mar 9

This page last changed on Mar 09, 2010 by [jbirch](#).

Present: Jim, Roman, Chris P., Julie, Bill

Absent: Chris S., John

1. Updates:

- [Moe in cold room---plan for mid-April deployment?](#)
 - Will use NEO for April 14 deployment. Julie to dust it off this week, and next week will discuss where NEO is in preparation for the deployment.
 - Probes on Moe: currently using 1 NED (IPC), 2 FAM, rest TAM. So far only 1 positive FAM, and several inhibitions on all channels. Will continue the cold-room test for at least 10 more days.
 - Roman giving Julie some deep water collected yesterday. May not have the inhibition that the surface water has.
- [Bruce and DA. Software Switched? Are we good to go?](#)
 - Bruce code was changed to latest (new) code yesterday. Roman firing off a DA today as a final check.
- [Array printing update?](#)
 - All tips are working and Roman/Nilo have printed 84 DA arrays. Will QC these this morning; if fine, then Chris P., gets Nilo to start printing the more difficult (longer) BAC arrays.
- [PCR reagents on Gordon---Chris P. update.](#)
 - Chris P. to remove reagents this morning.
- SPE columns---still waiting on quote.
- Chris P. still to check/confirm the IPC order. Sent in the PO, but did not hear that they rec'd it...

2. Progress update on papers:

- Chris P.
 - Discussed the Figures; much progress made. Chris will have rough draft of all figures by next week. Much discussion about what should be used to normalize arrays, background or other spots. She will try using several methods.
- John R.
 - Report from John:
 - * BAC:
Working with Chris P. on environmental data to present in her paper
- * HAB:Nilo and Roman have begun the process of turning array spot intensity into numbers for '08. I stand ready to assist in that processing, if needed, and I am ready to carefully examine how the significant patterns in the HAB time-series relate to the environmental variability (data from moorings, AUV, satellite). The interannual picture was mostly roughed out already, however I furthered the analysis by quantifying wind and hydrographic conditions of the '07 and '08 network deployments as anomalies (deviations from their climatological monthly mean). For example, this showed September '07 to be anomalously weak upwelling, and October '08 to be anomalously strong upwelling.* * ZOO:Working with Julio on ESP and AUV results for his paper.

May 11

This page last changed on May 11, 2010 by [jbirch](#).

Present: Chris S., Chris P., Roman, Julie, John, Jim

Absent: Bill U.

1. Updates:

- [Array printing update](#)
 - computer died this weekend. New (old) one is coming today or tomorrow. Perkin-Elmer sending tech to set it up and load driver but they will not help re-calibrate tips if that needed. Very disappointed with service they have provided for the price we've paid.
 - We are out of BAC arrays; these are first priority for Roman. There is also much work to recalibrate machine and re-create puck maps.
- [Cheri headed to McLane on Sunday for the week.](#)
 - She will take 2 SH1, 1 LAF, 1WCR pucks and filters/supports. Roman will help get those together.
- [NEO deployment next week](#)
 - (correct) reagents loading today.
 - ball screw has been replaced.
 - will hot-swap CTD on ship, so older CTD with current working driver will be in use. Bob Herlien can write new driver, but not until August.
 - Pressure sign inversion still to be fixed. Email sent to Scott to band-aid by placing different resistor on sensor board.
 - discussion about how ISUS is powered. Currently runs once every 20 minutes and thus 1 battery will take it 6 months. If sampling more frequently, we must upload more often and batteries discharge and memory fills. Must talk to Brent if sampling frequency to be increased.
- [Check-out/fix broken PCR modules](#)
 - We will assemble data on the malfunctioning of each module and submit to John D @ LLNL and ask for help. This will occur after the flip.
- [Bruce/Mack](#)
 - Mack had an extra puck in one tube, due to the machine being stopped when the hand was gripping over the carousel. We were lucky it fell into tube 5 so it could continue a HAB run from tube 4.
 - Bruce to be opened tomorrow.
 - We will appeal to Support Engineering to help in mooring cleaning and preparation.
- [John R. Paper progress](#)
 - John has sifted through contextual data and skimmed the nuggets of interpretability. Seems like a very nice story is emerging. He will send figures and outline draft of paper this week.
- [Chris P. paper progress](#)
 - Chris continues writing and gave review of the figures she's settled on.
 - still looking at submission to PNAS or Applied Env. Micro.
- [Methane Mound Cruise](#)
 - Much discussion on the timeline of the cruise and when things needed to be done. Chris P. had valuable input into when she could assist. The schedule still is somewhat flexible.

May 18

This page last changed on May 18, 2010 by [jbirch](#).

Present: Chris P., Roman, Julie, John, Jim

Absent: Bill U., Chris S.

1. Updates:

- [Array printing update](#)
 - Computer that controls printer is replaced and is running. Nilo coming in Saturday to print arrays.
- [NEO deployment next week](#)
 - Roman to paint cable tomorrow (Wed). Clean bungees, mooring assembly still to do.
 - Will use Gordon's CTD to test the new memory wipe method we will try on the deployment next week.
 - Must ohm-out the cable.
 - Julie saw a problem where carousel lost it's position; Brent and Scott both looked at and could find nothing wrong. Restarted. Standard PCR curves looking good.
 - Moe PCR's seem inhibited; Julie going to sample less ($< 1L$) to see if that brings up the signal. Chris P suggested altering pressure differential to try less hard to get 1L if water is mucky. Much discussion about how to deal with PCR inhibition.
 - Puck cleaning continues for this deployment and for Gordon. Arrays won't be ready until after weekend, so canning not until Monday
 - Melancon to come out Monday AM for filming.
 - puck cleaning continues thanks to Julie and Chris P.
 - getting MSDS on the anti-fouling paint from Patrick Whaling. No one really seems to know how toxic, so we will become the informed ones.
 - ERROR TRACKING: Kevin has nifty way of culling log files of all errors during a deployment. It does not catch the email traffic or solutions on how the errors occurred, but noting the failures is a start in our journey towards deployment experts.
- [MFB training](#)
 - Chris P has readied MFB10; MFB2 will also be used in training, but needs PCR module replaced. Cheri tasked with that when she returns from McLane.
 - Looks like 6 people coming for June 7 MFB training. 2 Stanford, 2 SCCWRP, 1 MLM, 1 Cawthron.. Others may float in and out during the week. Must figure out WHERE this training will occur.
- [D-ESP preparations--Gordon](#)
 - Chris P has started making reagents. PCR reagents from Patty to arrive today.
 - Must check with Brent to see that Gordon has correct config file.
 - Wed PM/Thurs AM will have reagents on Gordon
 - Core testing to start next Weds.
- [Bruce forensics](#)
 - Waste container does NOT appear to be full. No smoking gun on error. When we pulled from air1, it behaved like we were sucking fluid. Worked well from air2, but would not work from air1, so we aborted mission. Now it's working ; does not seem to be a 'tilt' issue...
- [John R. Paper progress](#)
 - Writing continues.
 - Possible places of submission: Harmful Algae, L+O Methods, Marine Biology Progress Series
- [Chris P. paper progress](#)
 - nothing this week. Too busy deployment/training/Gordon preparations.
- [BioSpace deployment in October](#)
 - John R. has a tube of rhodamine that will be in water to track current movements. We need to test in ESP at anticipated dilutions to see it's effect on our chemistry and on the PCR module. Chris P. will look into emission spectra

Science Meeting

Present: Jim B., Roman, Chris P., Chris S., Bill

Absent: Julie (deployment), John (sick)

1. Updates:

- [Brian Schlining and image analysis](#)
 - Science has met with him to discuss/explain anomalies in the comp spot intensities.
 - Chris S. states that the comp spots are not reliable indicators of background as they are very sensitive to small changes in what we a.) lay down on the membrane, or b.) signal probe concentration. This will need much work to fine tune. Meanwhile, Brian has enough to continue his image analysis work, which will pay dividends for the upcoming MRI.
- [John Ryan and his paper.](#)
 - This was his email:
 - a) Paper
QC and analysis of 2008 environmental data (satellite, AUV, moorings) is done. This provided clear results relevant to explaining / supporting the probe array signals, comparing 2007/2008, and highlighting observing system needs & challenges. I am culling the results pool and producing final figures and an outline this week, to be circulated.
 - b) Drifting ESP
The trajectory data from last year's drifting ESP test has been requested from Gene. When I get it, I'll provide the data and a simple velocity analysis to the ESP team, AUV Ops & the Rajan lab.
 - Chris S. mentioned that drifter position data was also located in the headers of the CTD casts, located here: \\Tornado\ESP\2009_ESP_Deployments\CTD data from WF cruise\sCTD Data Deep ESP jun 09
- [Array printing update](#)
 - Last Saturday we replaced Cavro pump. Nilo coming in this weekend to print arrays, but his schedule is becoming busier at school. Roman may have to step in and help. Two 'spare' printer kits have been ordered and delivered. We estimate a need of 70 HAB arrays, and 12 (Bac arrays?) for Gordon.
- [Bruce/Mack error analysis](#)
 - Roman will put data in Jim's temp box. Looks like Bruce had one error, but Mack errored on each run. Jim will work up.
- [NEO deployment plan](#)
 - Deployment on May 20 will be Roman, Julie, and a TBD.
 - Must replace ball screw that came undone; use a new one from Betty, not one from GG.
 - Get Brent to look at pressure-out-of-range issue
 - remove incorrect reagent
 - CTD driver issue. Will talk to Brent about approaching Bob Herlien to write drivers for the newest Seabird CTD's.
- [Chris P. paper progress](#)
 - Has been gathering papers for the abstract, introduction, and begun writing methods
 - Will bring a package of figures next week
 - looking at submission to PNAS or Applied Env. Micro.
- [Bill U.](#)
 - Provided movie and some data on methane mound.
 - 810m
 - Lat=33.779, Long = -118.747

Nov 2

This page last changed on Nov 03, 2010 by [jbirch](#).

Present: Jim, Bill U., John R., Chris P., Doug, Elif, Allison

Absent: Julie, Roman, Chris S., Vanessa

1. Items:

- Gordon and D-ESP preparation
 - Temperature calibration finishes today. Tomorrow (Weds) will run phase.
 - Join MFB and Core on Monday. Changing all core reagents Monday. Mount joined MFB/core into ball on Monday
- Uncanning triple deployment
 - Mack/Bruce both had hand issues. Mack worse.
 - Will uncan THURSDAY
 - need new power to Moe and start investigating MOE Thursday
 - pick up forensics on Mack and Bruce on Monday.
 - John wants LISST off Bruce before we wash
- Allison leaves Dec 11. Will meet with Jim and Chris to discuss direction.
- Chris P. will have PCR paper draft on Thursday.
- Temperature testing (Elif)
 - currently visual testing down to 2C
 - She'll have more reagent when we swap out Gordon. Even more from Moe and Bruce; must wait until Roman gets back.

Other items

Doug going in Jim's place on tomorrow's recovery.

Shana and Adam from Spyglass may also go.

This page last changed on Nov 30, 2010 by [jbirch](#).

Present: Chris P, Elif, John R., Roman, Allison, Bill, Chris, Jim

Absent: Julie R.

Items Discussed:

1. Cold testing

- Viscometer to arrive late this week
- Testing Idea:
 1. Place instrument at 4C and see if it works
 2. Let it warm up and start series at room temp. Use live culture in pressure pot to test system end-to-end. Do again with treatment 1 and trtmnt 2
 3. Drop temperature and repeat.

Test Matrix:

Temperature	wash/block alcohol %by v/v		
room	5%	10%	15%
10	5%	10%	15%
4	5%	10%	15%

- We should plumb all three (5, 10, 15%) at once and change mission to pull from each for each run
- Before each run, pull out samples to run on bench for comparison. These will only be HAB arrays, (no DA).
- Initially think this will be on MACK.

2. Upgrade of NEO

There is strong argument to change NEO tombstone for a 'regular' MFB. We have our eyes on MFB4 to mount on NEO but dependent on what Harvard needs.

Patty at Caltech plans to use MFB to do multiplexing, but when is unknown.

Are there any holes in Methane Mound data, as they'll need MFB to fill. Unknown, but probably a back-burner for them. Currently we don't know what contribution the instrumentation is making to the variation in the data. Gut feel is that we have endpoints and needn't worry about explaining away all variations we see. These will be point for future work, made in the discussion.

PLAN:

- Get MFB back from Caltech and prep it for Harvard.
- We WILL be swapping NEO's tombstone for an MFB.

3. Cores

1. Will place order for spares this week.
2. Repair Mack's hand
3. Must run standard curve with the few remaining arrays on Mack & Bruce
4. NEO needs checking out with necessary repairs and/or replacements

5. Finish Betty

6. Revalue Bruce?

- MOE and Neo will be in the Spring 2011 deployment (unless Betty is ready--she'll replace NEO)
- Bruce or Mack will be cold-test machines . One will go to WHOI.

4. Other issues:

- Must inspect all McLane pucks. Rejects to get sent back. Also must clarify the finish the pucks have with Ivory.
- We have a hoard of pucks that still need engraving.
- We need more HV puck testing. This could occur with the cold testing--Roman and Elif to work on together.
- All CTD's being sent back for service and calibration. Question; do we add an O2 optode or Clark Cell to our older Deep CTD? The goal for Deep is JdF, so what will work best there? Shallow CTD's to be sent out before Christmas. Need to decide about Deep CTD after the break. We have some time before the JdF cruise.
- Array Printer ; It WORKS! Priority will be HAB arrays. We need to block out time for ~150 arrays for WHOI and then ours. Can print max of 64/day. Chris P working on getting new/different BAC probs for the BAC arrays we will also print.
- Roman would like to lead a HAB BioSpace Paper. These data are on Tornado but hasn't been parsed the way Roman and Chris do it.

This page last changed on Nov 09, 2010 by [jbirch](#).

Present: Allison, Chris P, Elif, Roman, Doug P., Vanessa, John R, Jim

Items:

1. Just discovered that McLane Pucks do not fit in puck-puller, and some have burrs. Doug has done cursory inspection and they seem to be at the limit of tolerance specifications. Will quarantine and inspect after we get Gordon on MARS.
 2. Printer. Roman to try running printer without HEPA filter. Perkin-Elmer doesn't know what to suggest to do, even if they send someone. We are losing this one...
 3. Gordon. in the middle of core/mfb testing. Some issues with RNALater being left in WCR pucks. Will do some testing on NEO before implementing in Gordon. Tonight to run BAC SHA MFB phase (low pressure).
 3. Vanessa leaves saturday. She's running her MFB standards again and they are looking as good or better than pre-deployment!
 4. John R. reports that the LMO submission has gotten very favorable reviews. He will address and resubmit but things looking good for publication.
- Jim to tour Fred Byus (RADM, retired, formerly Oceanographer of Navy), currently VP for marine market segment for Battelle in the ESP lab.

Sep 14

This page last changed on Sep 14, 2010 by [jbirch](#).

Present: Vanessa, Julie, Bruce K., Roman, Jim

Absent: John R., Chris P, Chris S.

1. Items:

- [BioSpace Deployment](#)
 - Set for Sep 28 & 29. Most likely MOE will go to M0 on 28th, BRUCE and MACK to other two sites on 29th.
 - Crew not yet set, but Roman will lead deployments. Bruce K. will attend. Will decide the third. Bruce checking to see if anyone from EOM (Don Peters [eng.] or Mark Lambton [PM] might be here to attend the deployment.
- [Moe issues](#)
 - Julie has had some trouble with IPC on the MFB; it's internally consistent in it's Ct, but Ct's are different depending on if sample is run through the core or stand-alone. Julie has been hammering on this problem with advice from Chris P (on the WF Canon cruise). Might be a bad pull from PP1 pigtail, which has been replaced. She is also trying a 'better' IPC mixture.
 - Julie will continue to work on getting the instrument working; she leaves on a trip Thursday PM, and should not worry about canning, as we'll take care that issue.
- [Bruce](#)
 - Roman saw that Bruce failed the short DA yesterday, but discovered the puck heater was too hot to touch. Seems to be a temperature feedback issue. Will investigate with Scott today.

Missions for Biospace

- From Aug 9, Roman had notes stating we'd run 15 HAB/DA, 4 Bac, 3 Larv.
- julie/vanessa setting up Moe.
- all mission plans to be finished by Friday (17th) for discussion next Tuesday.
- Jim will contact Spyglass to find out where they are with the new puck cleaning.

Sep 21

This page last changed on Sep 21, 2010 by [jbirch](#).

Present: Vanessa, Jim, Roman, Bill U., Chris S., Scott, Brent, John R., Chris P., Doug, Elif, Liz O.
Absent: Julie

1. Items:

- [BioSpace Deployment](#)
 - Message from Aaron (Zephyr skipper) was he'd like to do 3 in one day. This crowds the boat and is not ideal, but we may go with this if we have divers. Still planning....
 - Precruise has crew being Roman, Scott, Vanessa, Bruce K.
 - BRUCE : Offshore site (SC), 52m water depth, with saline EtOH and LISST
 - MACK: Latmix site, 19m water depth, with RNALater
 - MOE: M0 site, 72m water depth, ISUS
 - will shoot to put all instruments at 7m below surface.
 - Radios. Still to be checked. Brent to download all files off shore stations to clear up space.
- [D-ESP Plan](#)
 - New IEP pump to arrive by end of week. Doug has ~3.5 weeks to install, test, and checkout.
 - Plan is to load reagents Oct 21. From then on the ball should be kept at 16C, which means van at 10C w/ sphere heater on.
 - Plan is to try and run 3 full phases as a checkout.
 - Sphere is closed Nov 17.

Other items

Chris P. leaving for vacation tomorrow. Returns Oct 4.
Scott on vacation Oct 4-20.

Software Development Meetings

This page last changed on Oct 04, 2010 by [jbirch](#).

2010

1. [Sep 15](#)

WHOI / NSF-MRI kickoff meeting

Present: Rich Schramm, Kevin Gomes, Brent Roman, Jim Birch

Absent: Brian Schlining

Discussion Items:

1. Goal is to create a 'state' vector which polls the instrument and creates a vector of current state of all relevant entities. Brent to work with Rich to create this de novo.
2. Rich's software will read this vector and move his animations accordingly
3. Kevin working on populating this state vector from the log file.
4. An issue with the animation software is the preciousness of screen real-estate. Thus, what views need to go together? Like carousel and hand, or hand and rotary valve...?
5. Needed to talk about how to animate the fluidics diagram.
 - a. Animation preference is in this order;
 - i. fluidics diagram
 - ii. happenings on the deck
 - iii. bag fluid levels

Image Analysis

Brian working on 3 files with fiducials to try and completely automate the alignment and analysis. Also working on a calibration curve of the intensity data. Roman needs to print another set of arrays for him. Brian said he'd look at the 2 sets before next week.

2011 Deployments

This page last changed on Mar 28, 2016 by [jbirch](#).

These are deployments during 2011 arranged chronologically (colors are same deployment)

Jan 4, 2011-- Recover D-ESP from MARS

March 31, 2011 -- Deploy Moe w/PCR to M0 (ISUS and CTD). This deployment to test adaptive sampling and overlaps with Kana and CANON Apr 18-29.

April 1 -- ship ESP Bruce (no PCR) to WHOI.

April 19 -- ESP-Bruce (no PCR, no ISUS, but with accelerometers) deployed at 43° 2.074" N, 70° 36.828"W. Depth 5-9m.

Lost communication sometime b/w 8-9am EST on May 17.
Iridium tracker checked, and it stopped transmitting May 11.
Sent boat out for look on May 18. Found buoy, but note radar deflector sausage is missing [here](#) and [here](#).

Sunday, May 22 rec'd following email:
Hello Monterey Bay Aquarium Research Institute:

I just wanted to let you know that one of your research ESP NEO buoys washed up on Crane Beach in Ipswich, Massachusetts (42° 41'07.48"N, 70° 45'46.21"W), found 8:00 am (eastern time) this morning (5/22/2011), see attached photos. The equipment attached to the buoy did not appear to be damaged. I notified personnel at The Trustees of Reservation, owners of the property (thetrustees.org), and they said they would go out and retrieve the buoy.

There was no PI contact listed on the buoy, and I couldn't find any information about ESP NEO on your website. So, I'm emailing the three of you assuming you would know who in your group oversees the project and equipment.

-Rob Vincent
rvincent13@gmail.com
603-828-5316

Photos of damage taken by Rob Vincent: [Photo 1](#); [Photo 2](#); [Photo 3](#); [Photo 4](#)
Map of locations: <http://maps.google.com/maps/ms?ie=UTF&msa=0&msid=213220825771739778963.0004a40bdd601babc291d>

May 23. Attempted recovery of ESP. Message from Roman:

We went out to the site where espbruce was moored and attempted to find it. The weather was very poor and water was very turbid. Using the ships depth finder we found a promising target. In difficult conditions the divers performed a search but espbruce was not found.

We recovered the mooring. It looks like the cable was pulled straight out of the cone. The top mast is bent but I cannot say if this was caused by a rough landing on the beach or boat impact. There are no dents or gouges on the mooring. The radio box is dry and antenna looks ok.

Thursday the RV Gulf Challenger may be able to survey the area with a side scanning sonar. This will be a much better way to search for espbruce.

Message from Roman May 26:

ESPbruce was located at 43° 02.0740 N 70° 36.8447 W at ~ 10m depth. This position is about 19 yards from the waypoint. So looks like it wasn't dragged and has maintained seal integrity. We will attempt to recover it this weekend if we can get the RV Tioga. If not will recover with the RV Connecticut on June 7th weather permitting.

Dates for a recovery kept moving as weather and scheduling problems arose. Finally, Roman reported on June 15:

ESPbruce was recovered today with no visible external damage. The EM cable strain relief is still on the cable. The recovery operation used two ships the RV Gulf Challenger and it's sister the RV Tioga. The Challenger supported the the side scan survey and the Tioga supported the divers and lifting of the core package and its anchor.

The side scan sonar operator advised me at the beginning of the day that he believed the esp package would be found on the bottom. He based this opinion on the data secured by his colleague almost two weeks ago. From his read of that run, he believed that the instrument was 15m off the bottom at that time. Depth at this site is 49m. He felt that the instrument was slowly sinking and that by today it was surly be on the sea floor.

Today's side scan survey took approximately 90 minutes. They had acquired a strong signature on the core and calculated that it was at a depth of 65 feet (~20m). The package was still located within 10m of the original deployment site. They dropped a marker line with a float as close to the calculated position as possible.

At this point divers equipped with twin 80 cu ft Nitrox cylinders and electric scooters dived on the marker. They had 70 minutes of search time. After 42 minutes an orange sausage float attached to a spectra lift line appeared. Then 10 minutes later a second lift bag attached to the EM cable appeared. The divers surfaced after a total bottom time of 62 minutes. Eight minutes to spare. We recovered the divers. They reported that the depth of top of the can was at 26 feet (~8m) right where it was supposed to be.

Recovery went smoothly using a single winch equipped with a capstan attachment. By alternately shifting the load from drum (used to lift anchor) and capstan (used to lift instrument) we recovered the package and the anchor safely.

May 2 -- Recover MOE from M0 on Zephyr. Also recovered in-situ incubators for Stanford.

July 6 -- Ship by truck D-ESP and supplies for JdF cruise. To Newport, OR.

July 13 -- Sail for Axial and JdF (1 day late due to weather getting up to Newport)

July 20 -- recall D-ESP. Recover all instruments. Two more days for Dave Clague. Ship returns July 23.

Aug 17 -- Matson picks up loaded ESP van. Genset on truck putting out >530V so our reefer unit will not start. Decide to send due to late hour and ship leaving tomorrow. Van wt. w/ all ESP-Drifter gear: 15,000 lbs.

Sep 9 -- Drifting ESP deployed from Kilo Moana N of Station Aloha. Running Bruce w/ MFB ?.

Sep 17 -- Drifting ESP recovered. Gear shipped Oct 7 (via DHX and Matson), arrived at MBARI Oct 12..

Nov 2 -- Install ESP Gordon w/PCR on Santa Cruz Pier. no CTD/ISUS data. Running water quality assay Kevan Yamahara developed.

Dec 19 -- Recover from Santa Cruz Pier

2011 Meeting Notes

This page last changed on Apr 29, 2011 by [jbirch](#).

1. [2011 Science Meetings](#)
2. [2011 Engineering Meetings](#)

2011 Engineering Meetings

This page last changed on Aug 31, 2011 by [jbirch](#).

All dates 2011

1. [Jan 6](#)
2. [Jan 13](#)
3. [Jan 20](#)
4. [Feb 3](#)
5. [Feb 10](#)
6. [Feb 17](#)
7. [Feb 24](#) - first discussion of adaptive sampling strategies
8. Mar 3 - CMORE Hawaii
9. [Mar 10](#) -- wand schematic
10. [Mar 17](#)
11. [Mar 24](#)
12. Mar 31 - team deploying MOE at M0; Brent at WHOI
13. [Apr 7](#)
14. [Apr 14](#)
15. [Apr 21](#)--wand schematic reminder...
16. [Apr 28](#)--D-ESP 2-Year Birthday Celebration!! (Poster is [here](#))
17. May 5 -- Visit to ASU
18. [May 12](#)
19. [May 19](#)
20. [May 26](#)
21. [Jun 2](#)
22. Jun 9
23. Jun 16
24. [Jun 23](#)
25. [Jun 30](#) --Final prep before JdF
26. Jul 7
27. Jul 14
28. Jul 21
29. Jul 28
30. [Aug 4](#)
31. Aug 11
32. Aug 18
33. Aug 25
34. Sep 1

Present: Scott, Bill, Chris S., Jim, Elif

JdF Preparations/ASTEP II Issues

DWSM

- Ti housing discussion. Doug sent note outlining where he thought this issue fell on the importance scale. Although a year-long deployment was promised in ASTEP II, it may be so cost-prohibitive (due to many other things besides the DWSM bell-housings), that we fall-back to shorter deployments. Must talk to Doug more about this and perhaps get other opinions on experience with long-term operations.
- Temperature Sensor on Wand. Bill thinks it has a very linear response and decision is to wait until Doug returns and has more wand completed before end-to-end testing of the temp sensor.
- Just on track for an April 25 DWSM build. Doug has assembled many of the parts nec for testing bag/switch subassemblies before rebuilding.
- Teresa working on shipping dates/logistics; our contact with this is Bill U.

WHOI Deployment

- Scott has accelerometer working; It will record Accel at 10hz for ~9min then spend ~1min writing results to flash. Much thanks to Scott for the 1-wk turnaround, getting the job last Thursday and completing the build/checkout by today.
- Scott leaves Saturday and will be gone tomorrow (Friday) for packing.
- Some discussion about the wrong o-ring groove in the clamps of ESP-Chris. Why? Is it a drawing or manufacturing issue? Scott tasked with checking this out, and providing info to WHOI on how they should proceed. Do we fix ESP-Chris, or is there chance we will be flipping ESP-Bruce to do another 45 days?

G3

- We have contracted Airflow Sciences to perform CFD analysis on a 10.5' LRAUV vehicle with enough data for Rob M. to calculate stability and fin area's for this larger vehicle. Should have results in ~2 weeks. This would give us a 3' payload space if the increased drag of a longer vehicle is acceptable to LRAUV team.

ESP Drifter

- Cruise is Sept 6-21. Phone conference immediately following this meeting with Matt Church and group at UH to discuss preliminaries of the cruise. Gene handling logistics once we get instrument to HI. Teresa has given Jim some container/van info for the transit across the Pacific.
- Brent working on Drifter comms.
- Discussion initiated by Scott that, with the addition of adaptive sampling code, we need (even more) to cordon-off ESP brains from mooring control. Perhaps the board Brent is working on as a mooring controller for Drifter could become the ESP standard, taking over adaptive sampling chores as well as contextual sensor coordination, while leaving the ESP to do only one thing. This idea is gaining traction; we will look into what other mooring controllers have been developed at MBARI, and/or if there are other S.E. to help with this to not put another log on Brent.

Apr 21

This page last changed on Apr 21, 2011 by [jbirch](#).

Present: Bill, Brent, Jim, Doug

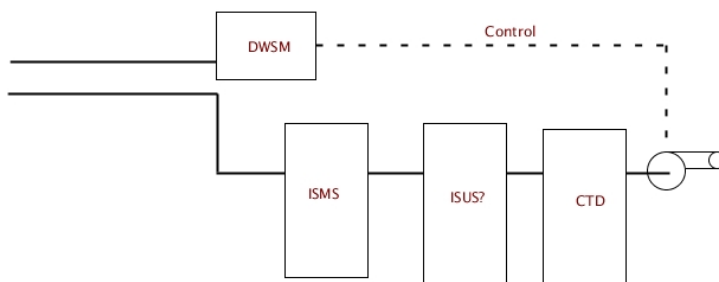
Discussion Items:

- Airflow sciences has been given the PO to perform calculations on a 10.5' vehicle. They are working on it now. Results in ~1 week ? .
- Note sent to Tong Chen of Teledyne describing high-level needs for sampler component to see if they might be interested in collaborating. He forwarded to Mike Metcalf and 'others'.

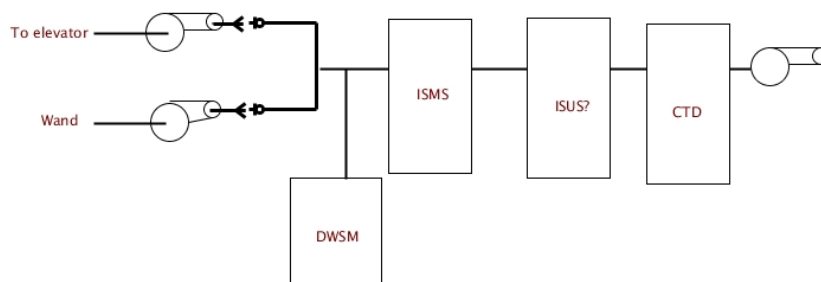
DWSM

- Doug testing a new bag cap assembly. This led to a lengthy tutorial on the construction of the bag cap and the problems he's seeing with the pressure compensation component. Now we know what the problem is (too much oil in the compensation-side of the system), such that the bag-empty switch is not thrown. Switches always seem fine; it's the hydraulic line that is leaking. Unclear why/how this leakage is occurring.
- Still on track for a first build of DWSM on Monday, April 25.
- Doug has wand designed; parts going into shop soon. Will work with Scott to have complete electrical build of the wand system finished next week for testing.

On MARS



At JdF



ESP Drifter

- Brent has been wrestling with his choice of host board. Finally can write files to internal flash, but must turn off lots of bells and whistles, making board much slower. Now will start layering things onto this board.
- Moxa boards work with the x86 but unclear if it works on embedded host. This is next hurdle.

- Will meet with Gene and Doug Monday to discuss Gene's battery tube needs. Might be some issues with the size he needs.

Items

1. Discussion of Cawthron visit (Chris Cornelisen and Rowan Strickland). Looking at a Feb, 2012 deployment. Discussion of potentially sending 2 machines.
2. Discussion of upcoming schedule after JdF. The fall may see a pier deployment at SC wharf. M0 deployment unclear; unsure of CANON intentions in the fall.* idea to not go on MARS until April 2012 and stay until October. This would permit extensive exercising of adaptive sampling, some preliminary discussion of how we'd trigger...
3. Teledyne contract/collaboration
 - What 'item' is confined/defined enough that we could use them to help?
 - pizza-pie concept
 - sampler filter elements. How contained? What is filter size? Pursue tangential filtering, or give them requirements and that as a possible solution.
 - Boards are also well-defined, but we may be going to different actuators, so boards may be very different than what we are currently using.
 - Jim talking to Metcalf tomorrow (Friday morning). **Update:** He had lost all his notes from our March 10 meeting (misplaced his iPad), and couldn't really remember what we had wanted. I reminded him of the email and (some of) it came back. He said he'd farm ideas around and would like to meet again, by early June. sigh.
4. Will contact McLane about our HV pucks.
5. Need to have a 'lessons-learned' with Yanwu regarding adaptive sampling, given our recent CANON experience with event triggering.

D-ESP

1. This past week was the 2-year anniversary of the first deployment of the sphere and elevator. There was a party and much frivolity to look back and see how far we'd come.
2. DWSM bag switch problem
 - Doug thinks he's found how oil is creeping into the hydraulic system rendering the bag switches inoperable. Leakage around barb fittings. Will try permanent glue at all fittings.
 - 1st build of DWSM is ongoing. Sample side progressing well with pulse suppressors in, and IEP replacement motor in.
3. Harvard having trouble lysing their thermophiles using our reagents/protocols. Pete suggesting maybe putting other assays on the MFB, but little time to develop new probes/primers. Older, proven probes/primers will give little scientifically interesting data. Looks like JdF may be turning more into an engineering test and archival mission.
4. Chris preston having trouble with lysing thermophiles for SHA; will try bead-beating just to see if the arrays work.

Apr 7

This page last changed on Apr 07, 2011 by [jbirch](#).

Present: Scott, Bill, Kevin, Brent, Chris P, Chris S., Doug, Jim

JdF Preparations

Wand

- Doug's selected a tubing (150F limit and metal reinforced) that looks promising. 30' necessary; may need to heat it to get curl out.
- Pumps and fittings are here.
- Need to check with Pete on whether Ti screen is necessary, or is SS okay?
- Brent leaving June 9 - July 6. Must do much rejigging

DWSM

- New encoder is in and has depressurized from 3100psi (but did have 900W peak!)
- Sample bags still has broken switches
- Resample side needs hydraulic damper added

Other

- ISUS. Will check with Luke on where the development of Deep ISUS is. Must be tuned to sulfides.
- ISMS. Must have it before tank testing.

Dates

April 25 -- First build of DWSM and wand test. Probes from Pete should be ready for printing.

April 27 -- Roman returns from WHOI

May 2 -- Core testing begins. Sphere Electronics are in.

May 9 -- Second DWSM build

May 16 -- Gordon Ready?

May 27 -- Gordon must be in ball (this likely to move FORWARD, as we'll be ready sooner)

June 20 -- In test tank

Software

- GUI. Would be good to get Stanford folks access to GUI and link shore-station data to our external FTP-site.
- Kevin to look into getting I.S. to r-sync to shore station and deal with this.

WHOI Deployment

- Bruce has made it!!
- Reminded that we should try and get acceleration data on our moorings in this area of fast tides.
- Scott got Andy's accelerometers (pieces) and will build two...
- We must still press WHOI to mount CTD on ESP-Chris so we know what's going on down at the can.

Aug 4

This page last changed on Aug 31, 2011 by [jbirch](#).

Discussion of Drifter Issues

1. Will send MELO notifications to jrobidart@gmail.com and to esp001@mbari.org
2. Sea-test on Aug 11 on Shana Rae. (This subsequently got moved to Aug 12).
3. Working in van will require constant hearing protection
4. Travel. EVERYTHING goes through Annette. Deployment will be charged to 708602.05

Feb 10

This page last changed on Feb 10, 2011 by [jbirch](#).

Present: Jim, Chris S., Chris P., Brent, Bill, Doug, Roman, Scott, Elif

Jdf

1. Much discussion of wand and development necessary to implement the 'trident' structure, with temperature probes at each intake. Conclusions:

Mechanically, building a 3-intake system is similar in difficulty to a 2-intake system.

Temperature probe design will require new development. 3 probes will need data-logger, with associated wiring/cabling and pass through's.

Given the time constraints on engineering, we will develop a 2-intake system with only 2 temperature sensors; one at vent, one at elevator. Bill and Scott will look into temperature probes that will not require separate data logger and subsequent software development. Roman suggested Seabird's mini-CTD's and will ask them if they have probes that would work for us.

2. We will not be implementing the wiring necessary for an ion-pump in the ISMS for JdF. This development may occur for MARS in Nov, 2011.

These conclusions need to be conveyed to Pete.

3. Chris S. and Chris P discussed the need to develop a skeleton mission in order to start determining the pump 'calls'. They wrote a straw man on the board (Bill has copy of). As this matures we will fold into the overall JdF concept of operations.

Other:

1. Potential site-visit to ASU in April. Dates still TBD.
2. We will plan a PDR for G3 in Nov, 2011.

Feb 17

This page last changed on Feb 18, 2011 by [jbirch](#).

Present: Jim, Brent, Bill, Doug, Roman, Scott, Kevin, Jose
Absent: Scholin, Preston, Elif

WHOI Deployment Issues

1. Discussion with Bruce K. this morning. He's reserved R/V Connecticut, April 17-23. Also has the R/V Tioga on hold. * Don Peters @ EOM has finished mooring design and lowered pump power req's through the gummy hose by lowering flow rate.

- They are shooting for a mid-March assembly date.
 - They are ready to order Freewave modems and Brent will re-send them his suggestions.
2. Must talk to Theresa to begin the shipping issue. We will be sending ESP-Bruce, a surface mooring, and many spares (bugees, etc.)

3. Discussion ensued about a 'travel pack' that would allow shipment of ESP and surface mooring anywhere in the world. One big-ticket item is He Leak Detector; do we need a 'to-go' one? Consensus is we should have a leak detector; risk too high to not check. Doug had looked into leak detector options 1-1.5yrs ago. He will dig up old research. Perhaps we can purchase a hand-held that is better than our current one, but not as massive as the Pfeiffer.

4. Jose attended to get clarity on battery priorities: This was result

machine	Deep-ESP	Bruce	MOE	ROV-Sledf
Currently	4 Lead Acid in O.Boxes	(6 alkaline O.Boxes	)	nothing
We need	8 lead acid O. Boxes	2 alkaline O. boxes	2 alkaline air-packs	8 lead-acid gels
when?	June	April 6	April 7	June?

129 Alkaline packs ordered (10 batteries/pack). Each deployment (Bruce, Moe spring, Moe Fall) will use 40 packs.

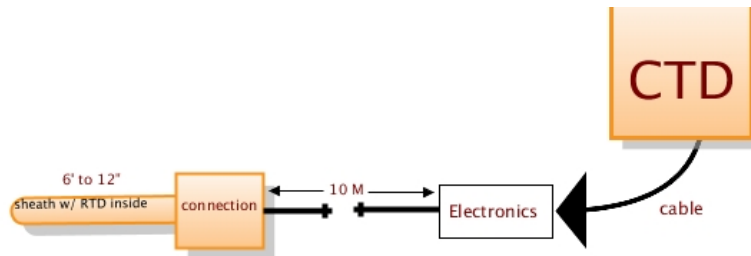
5. Brent has been in contact with Ivory RE: comms on the WHOI gummy. Ivory got 9600 baud using RS 422, but needed a ground, which was unusual. To make the WHOI comms work Brent estimates a week (5 full days) of work, which seems reasonable given our S. Cal experience.

6. Bruce is being reassembled and should be in the cold by Friday PM.

7. Will hold a 'travel' meeting tomorrow with Brent, Roman, and Kevin to hash out logistics of their travel to WHOI. Jim's office @ 11am.

Jdf

1. Temperature probe is achilles heel. We've decided to go with RTD detector, and working with Scott has come up with the following design:



2. must check that CTD does switch this channel off when CTD not running.
3. Scott to create a parts list for this design
4. Bill to order variety of sheaths and RTD sensors

5. DWSM

1. Gordon now out of ball
2. HP interface-new pump is in-system will need a full flush
3. Torque wrench found for pulling bells together for HP testing. Procedure is worked out.
4. ISUS cans have been pressure tested and passed. To be handed off to Luke after they drip dry.
5. New ISUS cable has arrived.
6. Pulse dampers are in shop. Should be finished mid next week.
 5. Travel issues:* Van gets dropped in Newport on Friday. We'll run the dock QC Saturday and Sunday. Would be easier to leave van on trailer with generator.

Other:

1. Shop is slammed. Know this when submitting stuff.

Present: Jim, Brent, Bill, Doug, Roman, Scott, Chris S., Chris P., Yanwu, Elif

Adaptive Sampling

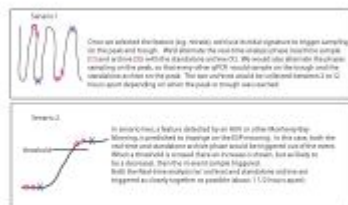
1. Question is, how do we spend our 40 samples during this spring's M0 deployment?
 - a. We will consider two scenarios:
 - i. high nitrate, high salinity (an upwelling event)
 - ii. rising nitrate, dropping salinity

The thought is to trigger on high and low nitrate peaks/troughs. We are not moving the 'instrument' so can't use yo-yo methodology. But can use tidal cycle. 1. Must track long-term background nitrate levels. Then, peaks are defined as 1.5x higher than background.

2. Also can compare to average peak height over last 7 days (e.g.). However we trigger, there will be a 1-day lockout time. Then a control sample every 3-4 peaks where nitrate is lower than monthly average by 1/2.

[]

3. The second part of this deployment is related to CANON, and we'll do an archive and a full phase, and we KNOW the event is coming. Thus, ESP waits until threshold is reached and then it fires when water mass is over it. This is fundamentally different than the scenario above in 1&2. Chris Preston summarized these two approaches in the below graphic.



In the last 2 weeks of the deployment, there's enough time to do 15 "events".

WHOI Deployment Issues

1. Current location is 8.2nm offshore. WHOI wants the EOM buoy near the NH buoy. This is untenable with our surface expression design. Could we raise our buoy? Talked about using EOM mooring as a repeater. Lots of issues.

Ideal case is we are in a place where we are our own entity.

May raise shore station antenna; will talk to WHOI>

Will check to see if WHOI can provide 800+lb anchor so we don't need to ship. 2. Must talk to Theresa to begin the shipping issue. We will be sending ESP-Bruce, a surface mooring, and many spares (bugees, etc.). 2. Began discussion of shipping container needed. Maybe a 10' one, half our current van size? It will need to be temperature controlled.

Jdf

1. Electronics box is the difficult. We've found a pressure housing but unclear about connectors.
2. The minimal setup would be a temperature self-logger; still waiting for one to arrive from Pete.
3. Brent to talk to data-logger builder to understand how to communicate with it.

Local Machines

1. Bruce has had high temp calibration. Then needs QC test. Then full-phase testing @ appropriate temps.
2. Roman will start assembly of MOE tomorrow. Chris P working on Moe's MFB.

Present: Birch, Scholin, Preston, Jensen, Pargett, Roman, Demir, Ussler, Massion

Items:

1. Drifter discussion

- Iridium Radio Checkout
 - Brent has rec'd loaner phone. Will activate today or early next week in order to test.
 - Should be returned by end of next week, unless it works for us, then we purchase (\$1200/ea). We need 2.
 - We must purchase month-to-month b/c prepay doesn't support short burst messaging. Will test open connection and SBM.
- Data logger/Controller
 - We must come up with functional req's. Gene will set up a mtg next week with the players: Gene/Brent/Scott/Chris P./Hans T.
- Wave analysis is currently being performed. Nov waves look like they get bad very quickly.

2. Spring Deployment

- For adaptive sampling, we need to use nitrate and salinity. May add temperature but much more variable than the first two. Chris P. to get this data to Brent.

3. WHOI deployment

- Brent testing his comms idea and works well in lab on >200' CAT5 cable
 - BUT, outside it did not. signal only went 50' on CAT6; 100' or more on CAT5 it did not work.
 - Possible issue was radio; must retry with another radio. If these adapters don't work, there are more expensive German ones that will.
- Bruce Cold Testing
 - Elbow motor was maxed out (300cts/tick) at room temp, but at cold it could never get this high (e.g., 10C was 210cts/tick at 100 mA; at 2.5C was ~100cts/tick)
 - Doug/Scott learned at ALA there are two types of harmonic drive grease. Unknown which we have. We should order new harmonic drive with low temp grease.
 - Could also put spot heater on harmonic drive to keep it warm(er).
 - Fingers on Bruce need tightening
 - Should siliconize top and bottom of pucks to keep from sticking. This is an important CONOP to share with Bruce @ WHOI.
 - currently running a cold spiked seawater sample to see effects on array.
- Need to start planning the forward team visit for radio testing, and MBARI's deployment
- Also, MRI team should go to exercise the software interface. Will speak with Kevin
- Must decide who will have access to instrumentation in the event of a crash.

4. JdF

- Girguis here Monday; have not heard from Vic about an ASTEP II phone conference update. Chris S. will try contacting her.
- Gordon Plans
 - Scott will mount the modified combiner box (2 48V buses)
 - We will pull Gordon out next week. Probably needs a once-over. Replace it with laptop 'brain' so Doug can continue testing DWSM.
 - HP interface needs to come up to 4500psi, so modifications needed on various parts
 - Testing of HP interface slated for week of Feb 14.
- Wand
 - Doug's option; put pumps at ends w/ checkvalves. He's found some pumps that would work.
 - We will test effect of the pump in-line with the sample
 - must get an idea of the impact of flow-rte on ISMS--will talk to Pete next week
 - pump will be closer to elevator
 - 35C is max temp DWSM can handle.

Comments

Max temp for DWSM is 51 C (125 F). It's the tygon tubing, which can be replaced if needed. The time to replace it would be the rebuild, 3 week of Feb. PVC based tubing would have a temp rating of 73 C.

Posted by [pargett](#) at Feb 04, 2011.

Items:

1. MARS testing end date. Will unhook next Tuesday. We have not been able to make MARS gag again. Craig Dawe would like us to go completely to 375V, so we can go back on the same port. We may retain 48V so we can talk to it, should the 375V go down.
2. About 1.5 weeks left to perform MARS clean-up.
3. Shop has lost a person, and water jet is down, thus very busy. New CNC arriving in Feb.
4. Reagents to be checked at Spyglass. The 0.1um filtered stuff has never been produced by them; we will probably send someone to oversee production.
5. Much discussion about JdF calendar. [Here it is](#).
6. G3 discussion. Scott brought test fixture to show off.

Items:

1. Event Detection Discussion

- Issues with event-detection on surface moorings are very complicated due to types of fluid-flow near the surface
- Much discussion on whether nitrate would be a better trigger for upwelling than temperature. Chris P. was asked if she can provide old ISUS and array data to see correlations. Yes she can.
- We will develop this for a surface deployment; logic will be on the ESP but thresholds will be adjustable from shore.
- We could also run this in 'test' mode, where it notifies shore that it should do something, and waits for instructions from humans.
- ACTION: We'll see how the data look to gain confidence we can get it to fire at the correct time.

2. D-ESP

- D-ESP is now opened, unhooked from MARS simulator, and in the van.
- Need to know what housing we will deploy with the mass spec. Does it need different mounting brackets, etc. Bill to look into by contacting Peter.
- ISUS-- the two deep ISUS housing have arrived. Doug will high-pressure test them the first 2 weeks of Feb. We still need to get the high-pressure probes ordered (Jim will ping Luke)
- Bill looked into turbidity issues at the 'Ashes' vent site. Unlikely we will need a 'prefilter' on the wand, but there may be issues with wand length. Must get requirements asap for any necessary development.
- Calendar is attached to last week's Engineering mtg notes.

3. Drifter comms

- Brent has looked into Iridium phones and believes a solution exists to use these on Drifter (and an other mooring that needs to go Iridium).
- We are moving forward on getting a loaner phone here to test before purchase.

4. Spyglass

- Although details are murky, Chris Melancon may have opportunity for contract work if anyone is interested. This would consist of being a tech-support 'lifeline' for newly sold ESP units. Please talk to Jim if you have any interest in this.

5. WHOI

- WHOI phone conference tomorrow at 11 to discuss EOM mooring design. We will have a preliminary mtg today at 2 to discuss the issues before tomorrow's phone call.
- When we ship our mooring to WHOI, we will be using old DSP&L (orange) battery boxes (with alkalines), not the new tubes we are developing.

Comments

There is excellent, inverse correlation between T and NO3 in Mont Bay as Ken J and Luke C have shown. This probably is most robust in the spring....

Posted by [scholin](#) at Jan 21, 2011.

Jan 6

This page last changed on Jan 07, 2011 by [jbirch](#).

Present: Kevin G., Rich S., Chris P, Chris S, Roman, Gene, Doug, Bill, Elif, Jim, Scott, Brent

Items:

1. Kevin gave an update on the GUI software, and invited users to a demo/discussion at next Weds software meeting. 11am in Surface. Rich also spoke with Brent about next steps in developing the machine visualization software.
2. D-ESP. Currently in the van, hooked into the MARS simulator. DMO will need to run some tests for several days. Batteries on D-ESP will be charged by this PM. Science will discuss the runs available to us based on puck load remaining.
3. Drifter
 - a. CMORE cruise will be Oct 7-Oct 21, 2011.
 - b. Gene presented high over-view of tasks and who on team would be most impacted (mostly Scott and Brent). Brent likely to take over comms issues.
 - c. PAR and ADCP need work. John R. may take over spearheading this.
4. NSF-OTIC
 - a. Meeting is Jan 27
 - b. Will have tele-con with Scott Soderburgh early next week for preliminary questions answered.
5. WHOI deployment. April 20, flip June 4, recover July 20
 - a. many exchanges with Bruce Keafer leading us to believe they are finally starting to see the difficulties with their mooring issue and timeline.
 - b. Chris S. continues to ping on them for information on comms and deployment logisitics.
 - c. We will be sending Roman out early, and probably Brent to do comms checkout.
6. Juan de Fuca (July 12-24, 2011)
 - a. Bill U handling logistics. Jim, Chris P., and Bill will tele-con with Pete Monday (9:30) for preliminary planning.
 - b. Pete here at MBARI Feb 7 to give 2:15 seminar. Will hold ASTEP II review with Orphan's group that day.
7. G3 disucussion
 - a. Much discussed about where initial efforts should focus (instrument parts, or system level blocks). Consensus was to work both in parallel. Starting with filtration and folding that into the trade-space of the system with repeated iteration.

Present: Chris S., Brent, Bill, Scott, Doug, Jim, Chris P.

Items

Drifter

- ESP-Moe is machine for Hawaii.
- We will move our Pt. Lobos day from November (originally slated for MARS deployment) to August 10 or 11 for a drifter test-cruise.
- During that test cruise, we will use ESP-Mack, as brains and surrogate core. Moe will be 'on launch pad' and we don't want to jeopardize reagents with a canning procedure.
- We are moving closer on purchase of refrigerated van. Grech has a few final questions to vendor, making sure the van proposed can go on container ships.
- Final Drifter meeting before Brent leaves is TUESDAY, 10:30am after science mtg.
- **Drifter Science**
- Must contact Julie to let her know MOE is ready (after checking with Roman)
- Will set up weekly science meetings to track preparation progress toward Hawaii

WHOI

- Bruce still not recovered; we could not get boat for this weekend. Looks like June 10 is soonest to try.
- Chris saw the buoy bottom cone and said it looks like wrench marks on the cone and that the cable had been cut. Unclear, but we should think about overtly linking buoys with MBA (as people equate MBA and MBARI), given their Seafood watch program may be seen with suspicion by the fishing industry in the northeast. We need better Public Relations in the future, just in case, letting fishermen know what the instrument is doing.

JdF Preparations

- Wand 'code' is very simple; on or off for two separate pumps.
- temperature probe on wand tip needs calibration validation. Bill to work with Brent on this this PM.
- ISMS and fixed temp probe to arrive from Harvard today or tomorrow. Will integrate next week.
- ISUS. Doug ordered him more 6-40 screws, but haven't heard from Luke.
- Now that we will have Iridium tracker decision is to use Acoustic Recall to return D-ESP to surface.
- Chris P. has workable mission script.
 - Testing still needed:
 1. Test temp probe calibration and validate.
 2. Test low voltage code (turn stuff off before we run out of juice)
 3. Test sampling at cold temperature
 4. move code to flash memory
 5. run (3?) full phases
 6. communications path
- Decision is to close sphere on Thursday, June 9 before Scott leaves on the 10th for vacation.

This page last changed on Jun 23, 2011 by [jbirch](#).

Present: Bill, Chris P, Elif, Roman, Doug, Chris S., Scott, Jim

Items

2012 Plan

- Discussion/explanation of the 'funding-line' sheet (green sheet--> [tasks for 2012.pdf](#))
- Chris discussed his thoughts for 900913, that include particle collection, in situ incubations, processing our archival samples, and finishing papers.
 - Other things to work on will be continued development of deep array, HAB work, and tech transfer.

Tech Transfer/Spyglass Issues

- Melancon has been sending emails around asking for help out at Spyglass as he starts getting his new stable of machines from McLane. We can help when we have time, as part of our Tech Transfer agreement. if he starts to pay anyone for their services, this must be declared immediately, and great care taken to separate MBARI resources from this for-profit company.

E/M Cable Cones

- We will get a cost-estimate for making 8.
- Question is whether we should look at redesign of strain relief, or strain-relief connection, or is there a better way of keeping strain-relief screwed on?

JdF

- What acoustic modem deckbox will we use? Check with Hans and Alana
- Must clean/straighten up high-bay for Open House Saturday
- ISUS

Jun 30

This page last changed on Jun 30, 2011 by [jbirch](#).

Present: Bill, Elif, Chris P., Roman, Doug, Nilo, Chris S., Scott, Jim

Items

Jdf

- Instrument is ready to go. Wed will load water to do post-transport QC.
- Packing logistics:
 - gas bottles are aboard
 - ESP-Betty will be loaded on ship in plexibox
 - Bill working on MSDS's for silicone oils, battery oil, batteries, He, and N2
 - Truck arrives Wed at 9am for loading. Will be met in Newport by Chris P. on Friday morning. Bill/Scott/Doug arrive in Newport late Sunday night.
- Mission Plan
 - The starting plan is [HERE](#) and Ruby script is [HERE](#). Weather and any number of unforeseen events may cause on-the-fly changing. Good Luck!!

Proposal planning

- Will check with engineers regarding travel and capital purchase items next year

Other Items

- No Science or Engineering meeting next week. We will have informal get-togethers before Friday.

Mar 10

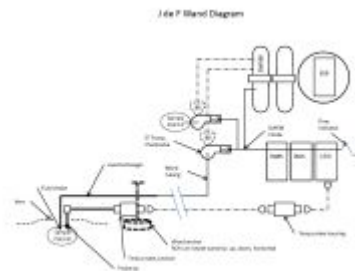
This page last changed on Mar 10, 2011 by [jbirch](#).

Present: Jim, Bill, Elif, Brent, Chris P, Doug, Scott, John, Roman

Absent: Chris S.

JdF Preparations

1. Doug sent out the following schematic for the wand design:



- Pete had some questions about wand height and how adjustable it might be in a rocky, uneven environment. We will get the pilots involved in these discussions.
- ISMS--Charles still working on it. They will send to us by the **end of April**, if not sooner.
- Berthing: Who is going on the cruise is still TBD. Harvard would like 3 berths (2 male, 1 female)--if there is room Dan Rogers might like to go. There was also suggestion to bring Karen Loyd for the ride (if room). Bill U. is working on this list and we will discuss at next week's science meeting.
- do we want Pete's mass spec temperature logger? Yes. He will ship.

Adaptive Sampling

Brent has created a simulation and provided a great demo of the code that triggers on certain contextual thresholds. He rec'd some input from Science on some tweaks. Yanwu returns next week, and he and Brent will work together to put Yanwu's code into Ruby.

M0 Spring Deployment

- Chris and Roman making excellent progress
 - MOE will have reagents by end of today
 - MFB gets mated on Monday
 - QC tests next week
 - Week of March 21 we'll test adaptive sampling
 - Can on April 1
 - Deploy April 7
- There was some discussion of the Zephyr also deploying another instrument at M0, using our cruise. Will check on this.

WHOI Deployment

- All systems moving forward. Turner Calvis  is the guy to contact at UCONN regarding divers. Roman is on this.
- We have selected site #3 as our deployment site. 4.3nm offshore and 113 ft depth Lat - 43.0347 N; Long - 70. 6172 W
- Notice to Mariner info has been given to Mike Kelly. He is waiting for contact person from WHOI in order to submit.



D-ESP

- DWSM has been reassembled but not torqued closed for high-pressure testing. We've ordered our own set of tools for that. Also found that the empty switch in the sample can does not work. This will need replacing, but high-pressure testing can continue before tearing everything open again. Must be careful not to squeeze the bag empty.

Drifter

- Will have a meeting of Brent, Scott, and Gene on Monday, 2pm.

Present: Jim, Bill, Elif, Brent, Chris P, Doug, Scott, Roman, Chris S.

JdF Preparations

- Parts for wand and temperature sensor are either ordered or have arrived. Build and design of wand continues. Temp probe tips have arrived and have been pressure-tested.
- encoder in HPP seems to have failed (again). Either because oil gets on it or some unknown electrical issue. Scott working on this problem.
- Doug awaiting new nuts that relieve us of having to use special torque wrench to get to recommended torque when closing DWSM for high-pressure testing. These should arrive tomorrow or Monday. Then high-pressure testing should commence (if HPP fixed).
- Bill has a straw man crew list for JdF [here](#)

Adaptive Sampling and M0 Deployment (MOE)

- Ran 1st integrated run yesterday; water very stinky and PCR was inhibited, but mechanically ran fine. Array was good. Starting 2nd sample tonight. We want 3 good runs in a row to say it passes qualification.
- Will set up MOE with ISUS and CTD to begin lab testing of adaptive sampling on Monday. John R. taking care of the ISUS cleaning/preparation.
- Brent to receive Yanwu's code on Friday and might work on over weekend to get it into 'ESP-speak'
- Deployment has been moved UP to March 31. Although this makes for slightly longer deployment we think no problem with power and # of samples.
- We are using the 'air-battery' containers for this deployment (not orange boxes). Almost finished, but must check who is making brackets for mounting these.

WHOI Deployment

- Currently we have 3 E/M cables. in meters: 15a, 15b and 20. The 20m did not ohm, and we found water and corrosion in one connector. That has been cleaned and 'resealed' with lots of silicone grease. 15b passed the ohm test, but showed some funky readings (i.e., not perfect). 15a works, and debate was whether to pull it apart. Decision was yes, pull, inspect, and grease. We will use this shortest cable (15a) for WHOI since there's lots of activity in the area of the mooring (lobster pots).
- WHOI to provide their own batteries, but we should test their polarities. Also make sure they have an interface cable if we're doing a hot-swap.
- Brent heading to WHOI on March 27. 2 days setting up shore-station, and 3 days assisting EOM/McLane in getting ESP to talk up their gumby.
- Roman working with Doug to see if we can rent a He leak detector while at WHOI.
- Various shipping options are being explored with the help of Teresa Cardoza.
- Kevin Gomes will meet with Chris P, Roman, and Elif to discuss the latest incarnation of the mission planning software.

G3 Development

- We will have a G3 meeting next Tuesday at the normal ESP Science meeting to discuss some discussions that Doug/Scott have had.

Present: Jim, Bill, Brent, Doug, Scott, Roman

JdF Preparations

- Wand design continues. Doug has ideas for a simple wand/heat exchanger. Will talk to pilots about their wishes.
- Scott discovered that failed encoder in HPP seems to be from vibration breaking wires potted in soft silicon. He's ordered 3 more encoders, and we have a brace made that will hopefully minimize shaking of the encoder. Doug suggested doing some math on maximum accelerations might explain wires breaking. Could be oil degrading silicon. Still investigating.
- New torque nuts (SuperNuts) have arrived.

Adaptive Sampling and M0 Deployment (MOE)

- MOE deploys in one week. Arrays and PCR looking beautiful, but implementing adaptive sampling causing difficulties.
- Porting Yanwu's code from Matlab to Ruby more involved than initially thought. This adaptive sampling code will not make it on this deployment.
- Revert to simple event detection (triggering on nitrate). First iteration of this code caused major Ruby crashes. This code has been changed and is being tested right now. We must make it through 3 runs to give it stamp of approval. We will know by noon if we continue with this code or revert back to old ESP code without event triggering. Much thanks to Chris P and Brent for hammering on this....
- 'air-battery' containers are at bottom of test tank. Paul C. working on mounting. They should be ready.

WHOI Deployment

- Still haven't pulled connector off 3rd E/M cable; one bolt is stuck. If it breaks, cone is ruined. Roman working this.
- Shipping option has been selected. Temp controlled truck arrives for loading April 1. Will arrive at WHOI April 7 or 8 into Roman's waiting hands (he fly's out the 6th). This shipping option costing ~ \$7K. We will need a place to store our totes at WHOI (no van is being left behind).
- Doug ordered cushioning material for ESP can. Will get Greg Voogd to help build a 'floor' that will sit in palletainer.
- Roman has sent out paperwork for He leak detector rental (\$700/week). They will ship it to WHOI; we'll have for 3 weeks. WHOI has He and N2 and regulators.
- Deployment plan:
 - Leave WHOI as early as possible Tuesday, April 19. Arrive at NH Science center dock that evening. Sleep on boat. Early AM, April 20, divers arrive, get on boat. Motor to site and deploy. Do some water casts around ESP while we make sure it's working. Return divers to dock and continue water sampling transect. Begin return to WHOI early

G3 Development

- Spoke with Jim Bellingham about a 2foot section on front of LRAUV. He suggests we do a quick remodel with his fluid dynamics guy. Email introduction has been made. He has also thought of the possibility of scaling the AUV to be bigger....sigh.

Drifter

- Design review today at 1pm. Brent leads discussion of communications and networkability.
- Our Satellite Phone account has been set up yet we have not rec'd any bills for the monthly fee. Brent to send contact info to Jim to deal with this.

May 12

This page last changed on May 12, 2011 by [jbirch](#).

Present: Brent, Scott, Chris S., Chris P., Bill, Jim, Doug

Items:

JdF Preparations

- Many decisions made on logistics of JdF cruise:
 - Shipping van will be kept at 15C for both shipping up there and returning.
 - Wireless network will already be set-up before shipping, so Chris P. can run the dock test whenever convenient before the 11th.
 - Chris P. to be in Newport on July 8 when Van arrives. Engineers will arrive on 9th or 10th. Load ship on 11th. Shove off July 12.
 - On return, planning for ship unload on July 23. Engineers can leave July 24. Bill to see to van loading and see it off on July 25.
- IEP pump needs calibrating after new pulse dampeners installed. Brent and Doug looking into that.
- Gordon does not need to be in ball before May 27, as originally planned.

Hawaii Drifter preparations

- We recalculated numbers for the power budget, which showed how difficult the mission planning will be for the drifter cruise. Chris S. will talk to Zehr/DeLong about their needs and how many samples/ how much water they will want to collect.
- Chris would like to be able to 'check-in' to the Drifter from MBARI. Brent says that is very likely; will work on when he returns from Europe.

Present: Bill, Chris S., Brent, Mike Conway, Doug, Chris P., Scott, Jim

Items

JdF

- Discussion of shipping needs. Mike Conway needs to know what is being trucked, what will be on boat, in order to know what Clague can bring. We have no idea what Harvard will want to load. This item needs attention. MBARI will need one complete 48' trailer. Here's the [Santa Monica shipment](#) for the Methane mound deployment.
- We will have 4 Ro-Pak's, two inside our van and two outside.
- Battery sleds were going in moon pool, but now may be shipped up on this truck (scattered among our van and ro-paks) and disassembled/reassembled in moon-pool area in Oregon.

Mission planning

- Brent already has code that will stop DWSM from starting the next sample if voltage below a threshold limit. This can easily be modified to stop ISMS if voltage drops below a (higher) threshold, in order to conserve power for Core functions.
- Will try to setup a test of this before he leaves. Chris P., to work on mission next week.
- Talk to pilots about mission planning. How does diving each morning to replace battery impact Clague dive plans? What is the radius they are willing to travel from ESP site, as coming up and moving boat will not allow enough time for meaningful work to be done by him at another site.

Communication

- We plan on using same hull transducer in WF for acoustic comms to the D-ESP. Hans Thomas has connectors that allow our Benthos box to connect. Need to check with him about this as date approaches.

Hawaii/New Zealand

- Shipping container being researched by Grech. Must make sure that plywood interior walls do not encroach on the 45"x48" dimensions of Ro-Pak.
- Our goal is a van that can be used 'intermodally' (ship, truck, train ) , maintain 40-60F, and use available power without too much hassle to convert...
-

Items

JdF

- With the issues of Harvard's primers, we have decided to install the core into the Ball Tomorrow. No use waiting for their primers to be tested, as nothing seems to work.
- Will set up CTD with the RTD pass-through on **Tuesday** so we can test the wand temperature code before Brent leaves. Scott has seen that voltages get passed through the CTD, but haven't been able to do any more extensive testing.
- ISUS and ISMS are supposed to be ready June 1. Doug has spoken with Luke, and we will use their 2000m rated probe heads. The chamber water must flow through is quite small, which will restrict flow to all instruments downstream, using our new wand flow setup. Thus, will mount ISMS in parallel to ISUS; Doug figures 80% of flow will go through ISMS, rest through ISUS.
- Satellite Beacon on D-ESP.
 - Issue: If ship must leave ESP and while we're gone, D-ESP rises to surface. Current radio link is for close proximity only (1-2mi). Several Options:
 1. Make recall of D-ESP only with ROV pull release, no acoustic drop-wt recall. This several lessens chance of unintended lift-off.
 2. Could mount ARGOS beacon to elevator. Ken Smith may have one we could borrow. Will ask when they return tomorrow.
 3. Could mount Iridium tracker to elevator.
- ◦ - Both ARGOS and Iridium cost ~\$4K, and have a small monthly data-plan charge.

Travel Plans

- Arrivals to Newport: Chris P getting there July 8, engineers getting there July 9 or 10. MOB the 11th. Shove off 12th.
- Departures: We've been told ship will return to port at 4pm, July 23. Probably not enough time to unload and make it back to Portland that day given the afternoon arrival. Teresa says we will be allowed to remain on ship the evening of the 23rd. Thus, de-mob on 24th, and make return plans for that day. Bill staying until 25th to load truck and see equipment off.

WHOI

- The ESP Bruce story being told [here](#).
- WHOI working feverishly to finish ESP-Chris mount and to test their buoy. Should know how/if it works by middle of next week.

Comments

we should put a sat tracker on the D-ESP - worth the \$ if we can't borrow one.

Posted by [scholin](#) at May 26, 2011.

2011 Science Meetings

This page last changed on Sep 13, 2011 by [jbirch](#).

All dates 2011

1. [Jan 4](#)
2. [Jan 11](#)
3. [Feb 8](#)
4. [Feb 15](#)
5. [Feb 22](#)
6. Mar 1 --CMORE Hawaii
7. Mar 8 --ad hoc mtg
8. [Mar 15](#)
9. [Mar 22](#) --Discussion of G3
10. [Mar 29](#)
11. [Apr 5](#)
12. Apr 12 -- Roman at WHOI, Chris P Europe
13. Apr 19
14. [Apr 26](#)
15. [May 10](#)
16. [May 17](#)
17. May 24 -- Roman at WHOI, Chris S at WHOI, Chris P out
18. [Jun 14](#) -- This has link to lysate dilution page
19. [Jun 21](#)
20. [Jun 28](#)
21. Jul 5 -- MBARI closed
22. [Jul 12](#) -- most of team at JdF
23. Jul 19
24. [Jul 26](#)
25. [Aug 2](#)
26. [Aug 9](#)
27. Aug 16
28. Aug 23
29. Aug 30
30. Sep 6 --Joint Science/Engineering
31. [Sep 13](#) --Joint Science/Engineering

Apr 26

This page last changed on Apr 26, 2011 by [jbirch](#).

Present: Chris S., Elif, Jim, Bill, Chris P.

Items

- Reviewed schedule. Chris P. think we are on track, although large amount of work looming.
- Harvard never responded to my request to join us. We expect probes from them this week. They are working frantically to get things to us on our timeline.
- Still deciding what to put on mRNA arrays; should know by Friday this week.

CANON

- Nitrate is incredibly low right now, so we will force-fire the full phase so the WCR can be ready when things become interesting. Prediction is that nitrate will start coming up later in this week. Should start blowing this PM. Trigger's now set for 9umole, then 15 umole. We hope to better coordinate with LRAUV on Thursday/Friday for front following.

Reagent Progress

- Bill has been testing ethanol in the diluent  to keep crystals from forming. Looks like we get a little over a two cycle shift in Ct's (worse) than Qiagen. We will not be using ethanol.

Apr 5

This page last changed on Apr 06, 2011 by [jbirch](#).

Present: Gene, Julie R., Chris P, Chris S., Elif, Jim

1. Much discussion (preliminary) about logistics for shipping ESP to Hawaii in September Drifter Experiment.
 - a. Decisions:
 - i. We will ship in a chilled cargo van with all reagents loaded here in CA; the van will be loaded directly on the Kilo Moana.
 - ii. Must get shipping prices for such a van, and
 - iii. What are power/plug requirements of K/M?
 - b. Also may want to get air freight prices, just to compare.
 - c. Mission to be downloaded before we ship instrument.
 - d. Julie to begin thinking about the number of samples we will run, given mission length.
 - e. Gene thinks 3 people would be ideal to monitor drifter, especially if ESP team is not pulled to do other work; Julie doesn't think they will be, as Zehr and Church teams will be complete to do their own thing(s). Current plan is Gene, Roman, Julie.
2. discussed how to adjust MOE's adaptive sampling strategy. Chris P. has a plan for this 'trial' week. She'll push down new mission tonight.
3. ESP-Bruce has left Chicago and should arrive @ WHOI Thursday. Roman flies out tonight.

Quick Science Meeting

1. Noted that pucks seem to be 'denting' on top and leaving o-ring impressions. This was after JdF cruise. We need to do some forensics on where these impressions are coming from. Single o-ring may be concentrating force in middle of puck and 'denting'. (later discussions make this unlikely; Doug says Ti is too stiff, and only compression is of o-ring, then entire clamp face is holding puck.) Bill has measured some pucks, and found irregularities, but engineering does not think findings are significant.
2. HAB/SHA testing (Elif)
 - a. we are testing cultures for contamination
 - b. Elif has created flow-charts for what needs to be done next (she will have child any day now...)
 - c. She'll organize her standards and primers. Still working on specificity of primers.
3. Bill and column testing
 - a. has Global-FIA columns and wants to test various column material (silica vs. hydroxyapatite)
4. CTD is ready for Drifter. Will clean deep CTD.

Will have a 'lessons learned' meeting in Sept, regarding flooding of ISUS.

Discussion of Drifter Science Plan

1. For 5 NIF genes have good standard curves for 4 of the 5. Won't use Gama Proteobacteria as these had poor standard curve.
2. Column on MOE has been changed. Don't know if leaving the column in after 1 or 2 uses is detrimental. Will bring extra columns to Hawaii.
3. Remaining task is to load reagents. Archiving at 5um and 0.2um.
4. Must check with Chris P to see whether the planned archive/PCR is correct, as far as waste generation is concerned.
5. check with Scott regarding power budget. Jose is organizing ESP batteries.
6. Roman and CTD:
 - a. has fresh batteries
 - b. calibrated for blue ocean water
7. Once recovered, get ADCP, CTD, PAR sensor data off so we have a copy incase we lose instrument.
8. Will have HOBO temp logger going and returning.
9. will use Mack for end-to-end testing on Aug 11 Shana Rae test day.
10. Con-Ops
 - a. We want to be near a convergetn front, far enough away to get similar water, THEN run in/through the front.
 - b. Whether to recover and move it, or simply tow it needs to be decided on the fly.
 - c. Mission will be real-time run for first 3 days (archive and PCR) then slow down the archives and continue PCR.

ESP Science Users meeting

Issues:

Chris P.

1. (some) probes ordered for JdF. Some were too clipped in the melt-curve analysis and we're waiting for new sequence from Harvard
2. Gordon out of Ball but still with some reagents. Chris to run some samples collected at diffuse vent field at JdF in 2004 to see if we can get both PCR and SHA from same sample.
3. Working on PCR paper.

Bill

1. JdF wand design
 - a. Spoken with Geoff Wheat who suggests getting into the vent crack. deeper into crack = higher temperature = more microbes. Geoff has two Antara temp probes he might loan. Also could get some custom HOBO's, but these wouldn't be real-time. Scott being consulted....
 - b. Roman waiting to hear from Vince @ Seabird. They are suggesting some options, but unclear whether their temperature gauges can go hot enough. Currently choices are A.) Seabird, B.) interface our own probe, C.) Adam Schultz--contractor who might make us probes. Will work with engineering on making this decision.
 - c. Some discussion of alternative site with hotter vents. Currently think that will have max of 40C at Ashes vents.
 - d. There will be no sediment at ashes. It's ROCK.

Elif

1. Ran experiment looking at array sensitivity of array when lysed from pressure pots vs. on bench. Both results were similar. This is bedrock work before going into cold temperature. Ultimately trying to see if cold reduces our array sensitivity; does a correction factor need to be introduced based on environmental temperature.

Roman

1. Bruce being reassembled and will perform the room temp tests (full run) end of this week. Then into cold over weekend, and cold test early next week.
2. Clamps on MOE would not compress the o-ring, so poor thermal contact on both clamps with pucks. Mike P looked at and found that grooves were too shallow. He will examine drawings and fix. Jim will email this issue to McLane.

OTHER ISSUES:

Chris S. sent email to Bruce K asking what their decision was for this spring deployment. Still waiting to hear.

Optode: Two types: Clark is sensitive to oxygen, but also to H₂S and needs frequent servicing. Optode needs far less servicing, but is less sensitive at low oxygen concentrations. Should we get Seabird to add an optode to one of our CTD's? Decision was yes, we could use both types. Will charge to 900915.

This page last changed on Feb 24, 2011 by [jbirch](#).

ESP Science Users meeting

Issues:

Chris P.

1. PCR paper in Scholin tempbox.
2. Will start samples collected at diffuse vent field at JdF in 2004 later this week.

Elif

1. Currently QC'ing new capture probes. Will help with cold testing Bruce once Bruce is reassembled and cold calibrated.

Roman

1. Bruce being reassembled and will perform the room temp tests today. If passes, then goes in cold today, and hopefully have GOM qualifications this week. Will try and have MOE reassembled by next week.

OTHER ISSUES:

Will send ASU template next week when Julie filters seawater collected Monday (2-28-2011)

WHOI needs Notice-to-Mariners filled out for ESP-Bruce. Mike Kelly needs following information (from 2-22 email to Birch): [I coordinate the local \(California\) NTM's. Could WHOI provide the contact email for the Gulf of Maine deployment?](#)

[Some detailed information is required:](#)

[Depth and Lat/Long \(as close as possible\)](#)

[Size and color of the surface buoy](#)

[Nav light flash interval and color \(e.g. Yellow, 1 sec ON, 4 sec OFF\)](#)

[Deployment and recovery dates \(anticipated\)](#)

[Also, a brief description of the project - usually 2-3 sentences.](#)

Waiting on info from Bruce Keafer

Requested HV pucks from McLane. Ivory said they are being worked on as we speak.

First 'Tactical' ESP Science Users meeting

Issues:

Roman

1. Comp spots still causing problems on array printing. Roman working on it and slowing his pace to interleave working on the instruments.
2. MOE is halfway apart/ Bruce is out of incubator. Both being worked on. Getting ready to test Bruce with chilled seawater sample.
3. Must start thinking of shipping to WHOI. New battery tube containers will not be ready. Using orange boxes.

Bill

1. Learning how to run the MFB.
2. He has his five-year review on Thursday.

Elif

1. Been helping out with QCing Roman's arrays.
2. Comparing new signal and capture probes
3. Building to cold-testing of cultures in cold seawater.

Chris P.

1. Data summary for MARS 2011 deployment is on ESPshare.
2. CTD and ISUS data for 2009 deployments has been given to Brent.
3. Pete has provided sequences and Chris may order tomorrow.
4. Presenting to Chavez group on Thursday RE: drifter and CANON cruise.
5. IPC--not needed for JdF. Should get it by mid-April with final batch by mid-May. No response from our explanation for sharing IPC outside MBARI.

Jan 11

This page last changed on Jan 11, 2011 by [jbirch](#).

Present: Jim, Chris P, Elif, Roman

Items:

1. Cold testing for WHOI deployment.
 - a. Elif has compared old wash buffer with 'modified' wash (50% wash, 50% buffer E) (at 2 degrees, viscosity of wash ~10, modified wash ~3)
 - i. blocking efficiency on blank filter is similar
 - ii. signal with biomaterial similar (BAC arrays)
 - iii. moving to test HAB culture; if no difference, then moving to run HAB culture in cold.
 - iv. ESP-Bruce going into cold on Thursday.
2. Array printing
 - a. Roman planning a massive, 1-week printing run in early Feb. Will try and knock out all WHOI arrays.
3. Discussion about using an unbuilt MFB for G3 development. Each missing some parts. Must talk to Chris P before building to know what needs to be done.

Discussion of schedule, both for WHOI deployment and JdeFuca in July.

Machine Plans:

Gordon -- D-ESP

Betty -- still to be finished; plan is June/July

Moe -- Spring deployment at M0 and Drifter in Fall

Mack & NEO-- Fall Biospace deployment

Bruce -- WHOI spring deployment

Jan 4

This page last changed on Jan 06, 2011 by [jbirch](#).

First meeting of 2011

Present: Jim, Chris P, Chris S., Elif, Roman, Bill U.

Items:

1. WHOI deployment.
 - a. Deploy April 20, flip June 4, recover July 20
 - b. Elif has done much work with cold testing of reagents. Rejected methanol as an 'antifreeze' as viscosity increases with lowered temps. Will try adding buffer E to block and see if that helps. Also will try ethylene glycol which she ordered today. Must also test lysis buffer without SDS and see if it works similarly to present lysis buffer.
 - c. tests will begin on the bench and move to the ESP.
2. Standard curves
 - a. Chris S. rethinking the efficacy of running standard curves when we don't really know the strength of the bugs being tested. Better to use a correction factor against Diane's old curves.
 - b. Roman has much testing to do (linker, spacer) but printer is running well.
3. ESP waste
 - a. Phone conference with Kevin Creed tomorrow to discuss our waste generation and whether mixing our bleach solution with RNALater is a problem.
 - b. Currently, all liquid and solid waste is identified as hazardous and disposed of appropriately.
 - c. Results from our discussion will direct redesign of the next gen waste container.
4. Bill has begun gathering logistics for the ESP cruise
 - a. we may use the CTD
 - b. will ship ESP in van, instead of transiting up on boat.
 - c. Will have a cruise planning mtg next Monday, 9:30am with Girguis to discuss cruise logistics.
5. Spring 2011 Monterey Bay deployment
 - a. Chris Francis (Stanford) wanted to follow a deep deployment with a surface, and may be interested in adaptive sampling for nitrate loving bugs.

Other items:

1. ASTEP II planning mtg was tentative for Jan 25. Now moved to Feb 7, when Pete will be here at MBARI.
2. Elif ready to number our remaining 'unnumbered' pucks. Must give her label series to begin with.
3. Melancon bringing China visitors from Zealquest on Jan 19 in the PM.

Present: Elif, Roman, Nilo, Chris S., Jim

Roman on vacation Aug 1-14.

Chris S on vacation Jul 13-19.

Items

ESP-Bruce at WHOI

- We will have Bruce K. remove temp-sensitive reagents and FedEx to us, and we will ship equipment back in Unrefrigerated van (\$5800 vs \$9200). Because of Keafer's schedule, ESP will not be shipped until July 25. Roman sending Hobo temp sensor to see what temp swings the van experiences.
- We need to spot-check the ESP temp calibrations upon return, just to be sure.

Pucks

- We have had 1200 puck pieces in need of serial number etching. We've rec'd the first 400 back from the etcher. Nilo is inspecting and will ready the next 800, probably in batches of 400.
- We've also rec'd pucks owed us from McLane (already serialized). These need to be inspected and Roman planning on doing lysis test with them.

CTD

- Newly rebuilt fluorometer seems to give same readings as an old working model. Roman/Nilo doing an 'at-sea' test right now--I'm watching them out the window bounce around in the Whaler.
- We need to know the range the fluorometer needs for the clean water at Station Aloha. It may need 100x sensitivity. So, order of events:
 1. Confirm **CTD-4894** is working
 2. Call Kilo Muana for their CTD sensitivity settings
 3. Call/send to Seabird to make the change
- Once drifter cruise is over, we will need to lower the gain for 'normal' use again. Next use may be the CA current drift in the Fall, 2011.

Drifter Cruise

- We have the Shana Rae lined up for at-sea test either week of Aug8 or Aug15.
- Next Tuesday (Jul 19) we will meet with Julie & Roman to start *intense* logistical planning.
- Chris would like to meet with Julie later in week to discuss:
 - All data collected so far on MFB related to drifter preparations
 - Progress on ISME paper
- Roman has array printing for this deployment completely under control.

Sybr HAB Assay development

- at 400nm, results on ABI looked good. MFB look similar to AOAb. Raised primer concentration and got much better signal on MFB.
- Elif rec'd many cultures of various pseud's and is making plasmids, as these cultures have become difficult to get.

SC Wharf Deployment

- We will start the ball rolling on this now. Looking at a mid/late October deployment.
- Should check with Ralphie about his CTD and the wharf guys about installing a new pump (Sept.)
- Elif would like to continue helping the QC of arrays, so it's not all up to one person (Chris P has Aug vacation, as does Kevan in Sept.)

Other Items

- We will decide by July 22 whether we will participate in the CANON Sept cruise. Things to learn by then to help in decision:
 - - what would be the mission?
 - Are we chasing upwellings or is it HAB related?
 - repeat of Spring deployment with adaptive sampling? Yanwu would need to be involved.
- We have new grant numbers for 2012
 - - SURF Center -- 901205
 - Detection Chemistry -- 901204

Items

Tech Transfer

- Cheri here working with getting NOAA machine running. Roman has identified many issues:
 - deepened o-ring groove on heaters
 - tightened carousel bearing reatiner
 - loc-tite outside of bearing
- room temp calibrations now finsihed; enviro chamber next for hi/lo temps
- ESP Chris has same flaws. Cheri will be responsible for redoing these.

Drifter

- Sea test is August 11 on Shana Rae.
- Will be using ESP-Bruce. Today hand and carousel calibrated. Check waste tomorrow. Array prints look good.
- Must check with Kevin on whether GUI will work on Kilo Moana in order to view data.

HAB/Cybr Assay

- Elif is getting cross-reactivity with non-targets on the ABI. Also having some problems with MFB5.
- Now concentrating on TAQ assay. moved primers a little but still cross-reactivity. Will continue tweaking Taq assay. Remember ultimate goal(s):
 - Want to do PCR for *P. australis* in ordre to
 - compare SHA and PCR results.

Pier Deployment

- NEO is going on Pier. Mid/late October. Chris working on upgrading everything and getting regular MFB (not tombstone) working.

This page last changed on Jun 14, 2011 by [jbirch](#).

Present: Bill, Elif, Chris P, Chris S, Julie, Jim

Items:

1. JdF

- Ball is literally in Doug's hands. He's building elevator. Several issues that we've applied band-aid fixes to...# 10m ODI cable has failed their testing and they are remanufacturing. Delivery date is on-or-before June 22. This will make it difficult to test connected to ROV.
- 1. Doug has found ground fault b/w ball and frame (reads 2 ohms). Mitigate by lots of zincs and short deployment time (10 days).
- 2. Carousel issues. Motor drawing far too much current and hot. Lubed carousel, loosened motor belt, milled home flag so no drag. Better, but still not like Moe. Decided to go with it.
- 3. ISUS is two week late. Unable to test new cable from (new) pressure housing to ball, as we needed to close the sphere.
- 4. Harvard's PCR assays do not work.
- 5. CSV valve leaked in the b/w 6 and 7 position. Exchanged with Betty's; leaked again. Found third valve that didn't leak. Unable to completely test, but Gordon did pass the post-can QC runs.
 - 2. Chris Preston's last day before JdF will be June 30.

3. Elif working on developing primers/probes for Pseud's. Has run into some contamination problems. Eventually we will need a lysate dilution step when going from core to MFB; We will get Chris P involved in that discussion along with Kevan Yamahara, possibly June 28. Chris has begun this [here](#).

4. Several jobs developing for Nilo. Puck and Carboy cleaning.

5. ESP Drifter.

- Julie to start attending Tuesday's to discuss Drifter preparations.
 - She has preliminary list of 'to-do's' (like a power budget)
 - She will be getting Hawaii water on the 23rd, to see if we can filter 2L, and how well her p/p work.
 - Currently going after 6 targets: IPC, Grp A, Grp B, Trichodesmium, Heterocystous, and a Synechococcus target

Lysate Dilution

This page last changed on Jun 15, 2011 by [preston](#).

This email discusses the changes that have to occur to have HAB arrays and qPCR from one sample event. It also incorporates the other possible code changes that have to occur on NEO. We should also keep in mind running the DA arrays in concert and how this affects the plumbing and valve moves of the PRV.

1. Copy NEO's current Flash to Tornado

6/14/11 Tornado/ESP/NEOtombstoneCode11jun14

2. Update code on NEO (Brent has already updated ruby code) and determine what is now "broken"

6/14/11 moved to bafflehead. Use user preston. Problems with /var/log setup and the correct path for mounting bafflehead. If it loose home or fails use /sbin/service nfsmount start to regain connection. You must be a superuser. Brent will have to look at this when he returns.

3. Rig with Dummy MFB to make seeing core moves easier
4. Determine if the AIV lines (to PRV and CBV) need to be changed.
 - a. To match other instruments and handle the larger lysate volume generated by the HAB protocol

6/15/11 With the current lines on NEO and new code only recover 700ul of lysate. Prime is not correct we loose too much. After CS.push to 0 the line between the PRV and PTV is completely filled with lysate which is all sent to waste.

5. Do we have enough lysate volume for delivery of 1ml lysate to the array and up to 250 ul for the qPCR?
 - a. update PRVprocess.rb to handling the priming of the larger volume (depending on length of CBV-AIV-PRV line this may effect the positioning of the lysate to the PRV for the bacSHAmfb protocol)
6. Update code to deliver 1ml lysate (undiluted) to array. Current protocol dilutes to 1.5M GusCN for BAC array.
7. Create and testing of habSHAmfb protocol based on the structure of the bacSHAmfb
 - a. Start with "normal protocol" 250ul of lysate and 225 ul of SPediluent
8. Testing of dilution of Lysate protocol

6/15/11 Dilution protocol will have to include a rinse of the mixloop. The transferPRV protocol uses the mixloop to depressurize the lines. Lots of concentrated lysate.

9. Timing of array hybridization with lysate dilution step --incorporation into habSHAmfb and mfb protocol

-----update of bacSHAmfb is not necessary for Pier deployment

10. CC clamp has to get the heavier springs

The second email Diluting Lysate for qPCR on ESP (Email 2 of 2)-- is exactly for that lysate dilution by the core prior to delivery to the MFB.

Brent added code to pass in an optional block in the loadMFBslug protocol, which will make its implementation much easier. It will have to be determined if the timing of diluting the lysate fits into the current time allotted for the hybridization of the array (if one is being run on the same sample.) This code starts once the concentrated lysate has been primed to the PRV.

The Major steps are:

- 0.5 rinse of the mixloop (Add to beginning of dilution protocol before loadMFBslug starts)

1. Airs out mixloop line (Currently done in loadMFBslug)
2. Dilution of Lysate (start with 1:10 dilution). Pulls lysate 0.1 ml then GuSCN 0.9ml (1ml total volume), into PS via PRV-PSV line. Then fills the syringe with air from the PRV. Mixes the lysate.
3. Move the diluted lysate into mixing coil.
4. Rinses the PSV-PRV-AIV/CBV line, bypasses mixloop (created samplePassF--based on samplePassCa)
5. Moves diluted lysate held in mixing coil to the CBV-AIV line. Primed to PRV.valve

6. Mixes diluted lysate with speDil (same protocol/ratio in loadMFBslug)
7. Positions slug in AIV for MFB (completes loadMFBslug)

Possible Valve Configuration Change for PRV::

GuSCN has to be primed to valve

Assumes that we don't change current DA reagent positions.

A. With DA reagents

- 1 AIV/CBV
- 2 ab1
- 3 speDil
- 4 guscn
- 5 Sipper // diluent?
- 6 waste2
- 7 ab2
- 8 air clean

If BAC arrays are performed on samples also for qPCR, then the sipper has to be converted into diluent.

B. w/o DA reagents (Nearly same as current PRV valve with MFB attached)

5/15/11 GuSCN is on PRV.3 Spare1: The valve configuration has not yet been altered.

- 1 AIV/CBV
- 2 diluent
- 3 guscn #was spare1
- 4 spare2
- 5 Sipper
- 6 waste2
- 7 spedil
- 8 air clean

```
def diluteMFBlysate #apart of PRVprocess.rb
```

```
# uses loadMFBslug above, but performs a dilution of the lysate for qPCR
```

```
# CAN PARAMETERIZE THE DILUTION???---Comes much later. Ask Brent how...
```

```
#Put in rinse of mixloop here.
```

```
loadMFBslug do
```

```
  #Mixes lysate and GuSCN into syringe
```

```
  Log.record "diluting Lysate in Syringe"
```

```
  PSV.to :PTV
```

```
  PTV.to :PRV
```

```
  CBV.to :PRV
```

```
  PRV.to :air
```

```
  delay 2
```

```
  PRV.to CBV
```

```
  delay 2
```

```
  PS.pull 0.1, PSslow
```

```
  delay 5
```

```
  PRV.to :guscn
```

```
  PS.pull 0.9
```

```
  delay 2
```

```
  PRV.air
```

```
  PS.fill
```

```
  delay 2
```

```
#Moves diluted lysate to PRV mixing coil
```

```
Log.record "Parking diluted lysate in Mixing Coil"
```

```
PSV.to :mixloop
```

```
PTV.to :PRVmixing
```

```
PRV.to :CBV
```

```
PS.push MixLoopPull #need to determine volume start with MixLoopPull
```

```
delay 2
```

```
PSV.to waste1
```

```
PS.empty
```

```

    PSV.to PTV
    PTV.to PRV

#Rinses PRV-AIV-CBV line, bypasses mixloop
samplePassF

#Primes diluted lysate to PRV (CBV-AIV-line)
Log.record "moving diluted lysate into CBV-AIV line"
    PSV.to :air
    PS.fill
    PSV.to :mixloop
    PTV.to PRVmixing
    PRV.to CBV
    PS.push 0.9 PSslow
    delay 2
    PRV.waste2
    PS.empty

#Mixes diluted lysate with speDil
Log.record "mixing lysate with speDil"
    PSV.to :PML
    CBV.to :PRV
    PRV.to :air
    delay 2
    PRV.to :speDil
    delay 2
    PS.pull 0.225, PSslow
    delay 5
    PRV.to CBV
    delay 2
    PS.pull .250, PSslow
    delay 5
end
end

def samplePassF cleanCS = nil #In samplePass.rb
#rinses PRV-AIV-CBV line, bypasses mixloop
#run option (flush) block afterwards
#also allows cleanCS protocol
Log.record "Beginning samplePassF"
CC.loadFlushPuck do
    MFB.bypass if defined? MFB

    #put 1.5ml of flush into PS
    PSV.to PSR, :via=> :waste1
    PSR.to :flush
    PS.to 1.5
    delay 5
    PSV.to :waste1
    PS.to 0
    PSV.to PSR
    PSR.to :air
    PS.fill

    #Backflush PRV - CBV line to CTV spit; bypasses mix loop

    PRV.connect CBV
    PSV.to :PTV, :via=> :air #Check this direction
    CTV.to :air, :avoiding=>:intake
    PTV.to :PRV
    PS.to 0

    #clear the line of fluid
    PSV.to :air
    PS.fill
    PSV.to :PTV

```

```
PS.to 0
PSV.to :air
PS.fill
PSV.to :PTV
  PS.to 0
  rinseCS if cleanCS
  yield if block_given?
end
end #samplePassF
```

This page last changed on Jun 21, 2011 by [jbirch](#).

Present: Bill, Elif, Chris P, Julie, Jim, Roman

Items:

1. JdF

- Ball had to be reopened to switch a communications pin. Will use this time to reload some testing pucks. Will not change PCR reagents. Will re-seal later today.
- Doug planning on test tank Weds.

2. Drifter

- Julie working on MFB 1. Her assays have been qualified on another MFB, so currently concentrating on being able to filter 2L, and what this does to the SPE efficiency, etc. Should be getting Hawaii water end of this week. Will test with that and higher-pressure pressure pots.

3. Roman concentrating on array needs. Will work with Julie and Chris P. for arrays for Hawaii and SC Wharf, respectively.

- ESP-Bruce recovered and will be shipped back to MBARI July 11.
- TTLab will start to get reorganized. Helpful in build of Betty and re-build of NEO.
- Chris P., will be needing help with the NEO conversion and will rely on Roman and Bill for the script re-do's she can't get to.

4. Elif has rec'd the SYBR assays, and will load on MFB 5 Friday or Monday with Preston help. She's trying to get assays ready for potentially a M0 deployment in Fall, although this has not been confirmed.

5. Bill testing MFB recovery of DNA with Qiagen wash buffer. Also has got MFB4 assembled from parts of others; still needs calibrating, both plumbing and heater module.

Present: Chris S., Elif, Bill, Chris P., Julie, Jim, Roman, Nilo

Items:

1. JdF

- Assays from weekend run look fine (post-can QC). Rbcl PCR still showing some positive, and arrays showing some (minor) positives, but background looks good.
- Spares: We will bring Betty in the plexi-box as a 'spare-parts tree'. While there may not be a total rebuild on the trip, she would provide parts for a quick DWSM repair early in the deployment if needed.
- CTD: getting serviced (new batteries) today.
- The only thing Science needs to pack are another filter rig and some carboys. Working that out with Doug on where those should go.

2. Drifter

- CS on Moe has been fixed. Roman is waiting on leaky waste until Julie goes on vacation (next week) before looking into that.
- Using 'Final Purge' after each WCR and 'MFB Final Purge' before PCR seems to remove enough contamination and saves waste space.
- McLane has a newly designed larger waste container. **we should look into purchasing, esp. for use with D-ESP.
- Julie has filtered 2L and 4L of Hawaii water. Takes about 1hr and 2:15, respectively through a 0.22um filter. She will do a power calc by comparing Watts up before and after.
- Here P/P are working; no inhibition despite larger amounts of seawater
- Roman to check carousel that was remounted.
- Arrays: Julie will set-up the probes and Roman will print while Julie is away. Julie will also list pucks she needs so they can be cleaned and ready-to-go when she returns.

3. Budget stuff for 2012 proposal

- Chris P will get her 900913 template to Jim for this year's budget input.
- Bill U. presented addenda to the budget that we will incorporate into the proposal.
- Any big-ticket items we need: a milli-Q water system?

Other Items:

- Roman heading to Spyglass this afternoon to help them with Lysis test---they need help. Their machine also seems to have a leak as bubbles are forming in one line.
- Does Spyglass machine have a name?

Neo Rebuild

- - Seem to be having the static issue we've seen on other machines. Host needs a capacitor. Scott notified.
- the new Ruby code does not work on NEO. This issue may need to wait until Brent gets back

CTD Issues

- CTD used on Fall, 2010 cruise needs calibration (Fluorescence to Chlorophyll was off by factor of 3). Chris P, said adjustment was done on the fly by comparing CTD with actual niskine casts at 20m.
- There was also the CTD with the mis-calibrated chlorophyll; where is this CTD and what's been done?
- Bottom line: Roman will inventory the CTD stable. Find out what range Julie wants in Hawaii, and get one adjusted for that range.

MFB Issues

- MFB 4 will be the lab 'drop-in replacement' machine
- We will build up one more from the parts of two (and it still needs major software upgrade) for lab testing.
- We need a sense of who is doing what with the MFB's. We want to make sure and accomodate:
 - - Mark Strom at NOAA
 - Steve Hallum at UBC (Steve will be coming here for sabbatical during 2012 to learn how ESP works)

Mar 15

This page last changed on Mar 15, 2011 by [jbirch](#).

Present: John, Julio, Elif, Bill, Chris S., Jim, Chris P

Absent: Roman

Core ESP preparation

- ESP-Bruce is about to start the 2nd of it's 3 pre-deployment runs. Hopefully finished with all on Friday, and we will be ready for canning.
- ESP-MOE has had MFB qualified and all reagents are loaded.
 - One worry is no runs have been performed since the rebuild. Tonight will run core-negative, tomorrow pressure tests, next week will fold in software changes for adaptive sampling. Then test with spiked nitrate to test the algorithms.

Array Printer causing problems--this time alignment issues. Roman will investigate when he returns.

BioSpace and SHA

- Discussed how we can put our results in the larger group context for the meeting planned March 28-30.
- Julio has run 32 gulper arrays for zooplankton, and trying to push to get 30 HAB's finished.
- John/Julio/Roman/Jim/Chris will meet to discuss how to put ESP data in line with hydrographic data and figure out how to present. This meeting will be Weds or Thursday this week.

Other issues

- NSF coming March 21 to film ESP stuff. Kim Fulton-Bennett organizing this.
- Much discussion about what our next 3-18 months look like:
 - Elif
 - develop p/p for HAB species
 - compare SHA results with qPCR results for HAB species
 - once p/p developed, apply these to transects from Chavez cruise
 - apply and help with prep for JdF, and SC Wharf
 - Chris
 - Prepping MOE for spring M0 deployment
 - Optimizing Harvard's probes for JdF this summer
 - Conversion of NEO to a grill-style MFB and the associated code changes and testing that will require.
 - Get NEO working to run HAB/DA/qPCR from same sample for testing on SC Wharf in fall, 2011
 - perhaps rubisco gene development for D-ESP on MARS in Fall
 - Bill
 - will return to process our multitude of archival samples
 - continue to learn MFB processes with goal to set up D-ESP MFB work for MARS in fall, 2011
 - continue as logistics coordinator for JdF this summer
 - farther out, lead a hydrate ridge trip in 2012 

Normal Science meeting was usurped by discussion of progress on G3 development.

Doug led meeting with progress to date on design approach.

- Took a Systems Engineering approach, which focuses on the *functions* we are looking for.

What do we currently know:

1. Volume of G2 components
2. G3 target and margins (considering a 2' extension to the LRAUV)



Right now, dry housing will hold 20 liters (current surface can is ~200 liters)

3. G3 system design by function
--this is Doug's "design dependencies" slide
4. Has 'cost' spreadsheet; helps predict leading costs--currently is Volume. This model was run on G2 and came up with 171L, close to can's 210L)
5. First run on G3 concept has run through the predictor.

Concepts developed

1. Fictional G3; this is the solidworks model everyone has
2. Pizza slice idea

Refinement of Functional Requirements

Some things we still need to know:

1. What contextual sensors will be on the AUV? CTD? ISUS?
2. LRAUV needs some 'payload' space in order to fly. (ADCP, compass). How does that cut into 'our' space?

Designs we have chosen to bring forward

1. Linux/Ruby
2. new CPU (Brent has chosen)
3. Reuse Dwarf cards bu change CPLD to FPGA
4. Will use power from vehicle, but they have not provided a power budget.
5. Mechanical: Must validate the extension of the AUV (NOTE: contacted Jim Bellingham who suggested working with their hydrodynamic modeler. Awaiting contact [3-22])
5. We are going with one pressure housing and a liquid barrier wall between ESP and drive compartment.

Cube/Filter testing

1. We need a solid baseline to compare filter efficiencies. Will begin with millipore water. When we move to particulates, it will require much empirical work to define trade space and decide.

2. Should also think of fractionation, as scientists will want to analyze many size fractions of filtrate.

Comments

re: cube/filter testing -- pure water should be filtered to a standard spec (e.g. 0.1 or 0.2um) so we can get the most repeatable flow rates/bubble pt measurements as per industry standards for characterizing filters.

For seawater samples, we should always include a standard lab bench equivalent (e.g., pressure driven or vacuum manifold) to compare both filtration efficiency and performance of downstream analyses. With such standard procedures, we will be better placed to evaluate G3 filter/upstream processing with seawater that will vary depending on when/where it's collected.

Posted by [scholin](#) at Mar 22, 2011.

Mar 29

This page last changed on Mar 29, 2011 by [jbirch](#).

Present: Jim, Chris P, Roman

- Quick discussion of MOE preparations. Deployment on Thursday this week. Plan to meet Scholin at noon to discuss the mission plan w/adaptive sampling for this M0 deployment.
- Discussion of Chris's vacation and Romans departure for WHOI April 6.

May 10

This page last changed on May 10, 2011 by [jbirch](#).

Present: Kevin, Chris P, Roman, Chris S, Elif, Jim, Bill

Items:

WHOI deployment

- Kevin returned from a GUI-development week, where he rec'd much positive feedback on ESP GUI. Many changes have been implemented. New version should be on Confluence by Friday. Older versions will then not work, as database structure has been changed.
- Complicated plans for ESP-Bruce recovery, depending on contingencies. Roman leaving May 21, to return June 11, unless he needs more time to run standards. This necessary as ESP-Bruce is giving very low numbers of *Alexandrium*--more investigation needed as to why. Final plans will solidify as June 7 approaches.
- **ACTION ITEM**-- Chris S. to contact WHOI to have a final conference call discussing this swap on June 7 and the various contingencies.

JdF

- Mission and communications to D-ESP will be unique. Unlikely we will need GUI for this cruise.
- Currently in the middle of qualifying 6 p/p sets for qPCR. Have learned that Harvard never ran any of these on an MFB, and some were only minimally characterized on their bench-top instrument. Standards for their two methanogen p/p were either bad, or not here yet. We aren't in trouble, but there is not much time-margin left...
- Roman printed SHA arrays yesterday, but didn't like the print quality. Too much power and not enough hydrophobic tip coating caused 'splash'. He's re-doing them today.
- Logistics still need working out:
 - crew list and bunk space
 - Flatbed will leave MBARI on July 6, arriving for unload in Newport on July 8. Instrument loaded on ship on Monday, July 11. Shove off July 12. Will discuss travel to/from Newport at engineering meeting.
 - Screen on end of wand. Doug P suggests a 0.2mm screen size from Ti. Can't find a 0.5mm one in Ti. Do we have contingencies if it plugs? No. Maybe make it big and bulbous to lessen the likelihood of plugging.

Other Items

- We will buy the 'suck-and-sniff' He leak detector. put on 900915. Roman will order.
- We will buy optode for O2 sensing for D-ESP (see Feb 15 notes). Still needs ordering. Roman.
- The Fall deployment schedule still somewhat unknown. We will be putting an instrument on the pier, but unknown exactly when. Will an instrument be in the bay at/near that time? Still to be determined. There would likely be the first time(s) the new GUI would really be put through its paces.
- Bill and Chris have been testing whether EtOH would be a better diluent than our current SPEDil, but notice a 2 Ct shift (worse) with EtOH.
- Chris P talked of doing direct PCR on 0.2 HA filters to look for viruses.

Present: Chris S., Chris P., Bill, Julie, Elif, Jim, Roman

Items

ESP Drifter and Hawaii Cruise

- Chris/Julie's preliminary work shows that waste volume allows only 40 assays. Thought is to perform 40 WCR's and 17 PCR's.
 - We could change **MFB Final Purges** to **Final Purges** to save on waste space.
 - Want 2L volume for each sample. Need to know how long for power-budget calculations.
 - Julie to test both the above issues,
- Plan is to do DeLong's stuff first (2-3 days of WCR every 2 hours), and intersperse the PCR within that. DeLong may lose 2-3 WCR's with this scheme.
- Chris S. suggests dropping it near a front so it will eventually cross.
- Julie has filters from the latest ALOHA cruise. She'll use these to create lysate and see how well her p/p work.
- Using MOE for this deployment. Currently, CS is rusted, and waste container seems to be leaking. Roman to work on before leaving Saturday.
- Schedule:
 - Cruise is Sep 6-21.
 - Will need 1 week prior to MOB to run dockside standards.
 - Will ship instrument in refrigerated van, reagents loaded and closed, but not final seal.
 - Ship on ~ Aug 19, depending on transit time.

Array printer

- alignment still needed. Hopefully finished by PM today. Will print tomorrow. Chris says she doesn't need arrays, but current print needs testing to make sure. Roman operating as if more are needed.

JdF

- Chris P. and Bill have put much work into a straw man schedule. It is [HERE](#).
- We will not purchase an optode and refit our Seabird CTD. Too much \$\$ (\$5K for optode, \$3K to Seabird for firmware changes, plus cables)
- Do we use the Clark? TBD. Must check with company about H2S effects on electrode. Are effects reversible? Bill looking into.

HAB PCR

- Elif working on getting probes for SHA bugs.

Sep 13

This page last changed on Sep 13, 2011 by [jbirch](#).

Present: Jim, Doug P, Chris S, Chris P, John R, Brent, Bill

General

- Be sure to check out the fantastic job Kim FB is doing on the CMORE Drifter Blog.
- Kelly Lincetum from ASU may be coming out next week to go on the Zephyr and collect water. ASU needs 'background' and this would give them a window into foundational oceanography, and perhaps give a better appreciation of sampling issues as it relates to their PCR efforts. We may have a big 'filter-fest' and save some for us.

ESP User Group Meeting (Sep 27-29, 2011)

- This meeting will discuss G2 items only.
- Chris S will give high-level overview. John R high level overview of L+O paper and BloomX update. Chris P high level PCR (not water quality)
- MBARI is finished at 1:30 on Tuesday, although there is an afternoon session Weds afternoon at Spyglass. May have Chris p, Bill, Doug attend and talk about pier stuff.
- We will suggest shortening the panel discussion Tuesday at MBARI and make room for Brent to talk about comms. (Jim to contact Spyglass)
- Also suggest moving Kevin's GUI discussion to earlier.
- Spyglass needs arrays for this meeting. We do not have. They should contact WHOI.
- Will email Melancon/Shana a copy of the Nov, 2009 Fluidics path diagram.

Core

- Pier deployment on schedule for Friday, October 14. Will wait until Roman returns Sep 26 to start pinging Pier guys for access to set-up radios
- Latest SW changes for combined array/PCR have introduced very BIG script changes. These changes will need to be pushed out to the upcoming users who want to do both PCR and SHA.

G3 Development

- Functional Requirements document has been updated and sent out to team for comment. Please return comments by end of week and Jim will incorporate. Req's document will be kept on Confluence with date stamps so most recent will be easy to find.
- Some confusion about what separates the 'Sampler' module and 'core' module (analytical module seems well-defined). Some effort needs to be expended to define the Sampler a little better.
- This new 3-box division (sampler, core, analytical module) makes some sense with regards to breaking up labor, but careful attention needs to be paid to the where the 'fences' are between boxes and subsequent effects on requirements so each box will play well with its downstream neighbor.

2012 Deployments

This page last changed on Apr 25, 2013 by [jbirch](#).

Deployments during 2012 arranged chronologically (colors are same deployment)

[March 5](#) -- Gordon w/PCR, CTD, and ISUS. Placed close to shore in shallow water (36 46.742 -121 49.142) to test new shockle system and cell phone modem, as well as rejiggered thresholding software. This is system to be run in New Zealand.

Schockle rubber broke March 7, causing high peak accelerations as can kept pulling taught against the strength member.

Recovered [March 8](#).

Cawthron Deployment

A. Cawthron Planning Document

B. Cawthron Shipping details

March 19--ESP Sea-van leaves MBARI for Oakland

March 20 -- two cores, supply box, N2 dry shipper, and array membranes leave for air freight.

March 25--Chris P and Kevan fly to NZ. April 5 Brent flies to NZ.

March 29 -- two cores, supply box and dry shipper arrive

April 22 -- Scott flies to NZ.

April 24 -- ESP Sea-van arrives at Cawthron

May 1 -- Deployed ESP-Gordon with MFB10, ISUS, and CTD.

May 3 -- team returns to MBARI.

May 31--Gordon recovered from Tasman Bay. Waiting for Chris P arrival and uncanning.

June 1 -- Uncanned Gordon. Sub1 valve makes weak flubbing sound, not nice strong click. No sub getting to the arrays; this explains their darkness.

June 24 -- Sea van leaves NZ. Scheduled to arrive Oakland July 15.

WHOI Deployment of ESP-Chris

April 15 -- Roman flies to WHOI; returns May 5

May 2 -- Deploy ESP-Chris

June 4 -- Discover intake syringe mechanism has failed; jams under load but works fine when moving air. This came after only pulling 300ml on most recent run. Recommend shutting down and recovering.

NOAA/Woods Hole Deployment of ESPFRIDAY

May 16-17 -- Scouting trip to Friday Harbor for shed build and comms checking

June 2 -- ESP Friday deployed on dock. Tentative to end July 16.

June 26 - continues to run, but lost internet access due to an unknown networking error.

Diversion Experiment; So. California Deployment of ESP-Gordon / NEO

Aug 30 -- Haul instrument and gear in trailer and MBARI van to deploy on OCSD R/V Nerissa. Calm seas, hot weather, instrument in ~10:30am. Gordon w/PCR, CTD, ISUS, cell-phone modem (T-Mobile). Sewage diversion to begin Sep 11, 2012. Machine located at 33.59703 -117.94623. Divers from Orange County Sheriff's dept.

Kevan collecting data here: <http://www.stanford.edu/~kevany/ESP/>.

Sep 14-noticed CTD battery draining faster than expected because of optode. Also, ATV encoder in MFB kept returning 511, which is $2^{*}9-1$ meaning all bits are stuck high--typical way they fail. Stopped PCR, continued SHA, but with dead CTD no contextual data to adaptive sample off of. Decision to flip for NEO on Sep 26.

Sep 26-recovered ESP-Gordon and swapped both batteries and ESP-Neo. Also changed CTD so now no optode (O2) measurements. One power cable fizzed away. Connector on pickle jar loose. But NEO now running well. Skipper gave deployment coordinates of 33 35.829 -117 56.759. Xeos says 33.59702 -117.94604. Water depth 18m. CTD/can depth=6.3m. Divers from LBAoP--Eric Castillo and Steve Lang.

Oct 16-Recovered ESP-Neo. Divers from LBAoP--Steve Lang and Veronica Anderson.

Fall CANON--Drifter with ESP-Moe / Moe

WF leaves MBARI Sept 10. Moe with PCR, ISUS, CTD, PAR, and buoy has downward ADCP. Roman and Julie R. on ship.

Moe went into water Sep 11. First phase slated for 6pm.

Pulled Sep 17 (10:30am). E/M cable started flaking out either due to connector or bad ethernet extender. Decision to end mission unrelated to this.

This page last changed on Jan 05, 2012 by [jbirch](#).

Concept of Operations for Cawthron Deployment.

As of Jan 5, 2012:

Where?

Tasman Bay east of Riwaka

CAWTHRON INSTITUTE
98 Halifax Street East Nelson 7010
Private Bag 2 Nelson 7042 . NEW ZEALAND
Tel +64 3 548 2319
Fax + 64 3 546 9464
www.cawthron.org.nz

When?

Looking at a 30-day deployment in the April/May 2012 time frame. They want to deploy when there is a high likelihood of rain.

Targets?

This is from Oct 28, 2011 email from Chris Cornelisen:

It would be best to focus on water quality/HAB; however, we are also are interested in running the larvae array; hence we would likely split samples as suggested in Kevan's earlier email (e.g. 21 QPCR/HAB + 7 LARV, total 28 samples), with the remaining samples archived. Running the GenBac marker instead of one of the Pseudo ones would also be good. I'm not convinced of the usefulness of the HBac marker at this stage. We can do bench top work and test the markers/arrays ahead of time using samples from the site and your protocols. Kevan/Chris P - feel free to contact Kirsty Smith directly to further discuss next steps.

And items related to sampling design:

Prior to deciding on whether we would use an environmental trigger(s) for sampling, We'd like to put together a wider plan for the deployment of the ESP. i.e. how will the ESP contribute to the bigger picture and augment additional efforts (Synoptic surveys, additional buoys/sensors, etc.)? Basically, we would aim to deploy it within a broader temporal and spatial framework as used in the recent Ryan et al. paper (albeit with less toys). I'll draw up a straw man for this.

Communications?

Brent has communicated with Paul Barter and we will be using a cell-phone modem to connect buoy to cell-phone network in/near Nelson.

Shipping?

Two cores (both with MFB modules) will be shipped to NZ: Gordon and Neo.
These will be 'dry shipped' via air freight, either in their pressure housings or in (still-to-be-built) plastic boxes, which will make customs easier to navigate.
Cawthron will order all reagents from manufacturers; MBARI will thus avoid Customs issues.
Printed arrays will be (air?) shipped separately. Must research restrictions for flying nitro-cellulose.

Buoy and mooring infrastructure will travel via boat to NZ.

Who and how long?

TBD

Cawthron Shipping details

This page last changed on Jun 22, 2012 by [jbirch](#).

Ship to:

Cawthron Institute
98 Halifax St. East
Private Bag 2
Nelson 7042
New Zealand

Overall Shipper:
TNL--Auckland, NZ. Christine Palmer (very unhelpful)
KSI--NZ Customs Agency

Sea Shipment
Lisa Parlier
Primary Freight Services
Rancho Dominguez, CA
310-635-3000 x243

Van Picked up March 19; deliver to Cawthron by April 25
20' ESP Van contained:

- **2 palletainers
- *1 ESP base with pressure housing can
- *1 buoy
- *1 He leak detector
- *1 orange lift table

2012 Meeting Notes

This page last changed on Sep 28, 2012 by [jbirch](#).

Meeting notes are no longer being maintained on Confluence. (sep 2012)

1. [Jan 31](#)
2. [Feb 2](#)
3. [Feb 14](#)

ESP Meeting

Items:

- Chris P, Roman, Mike P meeting at 2:00pm today to finalize the BOM for the MFB
- Most people could make a March 14 field trip to Sandia in Livermore. Will check with Ken Patel to see if it works for them.
- Jim will get Material Transfer Agreement for the Qiagen material; Scott Burrows may come visit March 6.
- We need to set up Confluence page to allow LRAUV access
- Will come up with decision tree on technologies to use by Feb 28. Will then Review on March 1 when Chris can attend.

Puget Sound Deployment

- 2 deployments, both using cell-phone and on piers.
 - First will be late May to late June, while Vera is teaching a class at Friday Harbor.
 - Second will be in August in Samish Bay (lat/long is 48.610416,-122.437445).
 - NOAA has no operating funds and will need arrays, pucks, and reagents.
 - deployment logistics still to be worked out.
 - We will want to install HOBO's in their machine to watch for temp fluctuations
 - Must set-up site-visit dates.

Cawthron

- Chris and Kevan have a reagent list. Roman to provide what Puget Sound will need. This order and the dates needed will be given to Spyglass this week 
- Look into bonding our container shipment to speed through customs.

3G ESP

- Spoke at length with Doucette/Connel about their reagent needs in the Gen 3 instrument. Bead beating looks like a great thing for them.
- Right now, aqueous methanol extraction works and would require 3 reagents total: aq MeOH, primary Ab, PNA buffer.
- from 1 ml of aq MeOH lysate, pull 250ul for Ab labeling and/or 250ul for PNA labeling before sending to SPR.
- Work on Dissolved DA revolves around running filtered water through a resin to concentrate. Hope is that methanol would be the eluate and everything downstream would be same as above. form factor of resin column is not decided yet. Greg and Nick working on this right now.

ESP 'Science' Meeting

Cawthron

Trial Deployment

- We will do a 'trial' deployment of new mooring to test before Cawthron. Initially trying for week of Feb 27 using Shana Rae. Scott leading this. Jim Christman has been emailed to ask about dates (2-13).

Communications

- GSM does not support incoming data on their networks. Brent has two possible solutions for data transfer that he's working on.

Deployment support

- Kevan and Chris P getting reagent list together.

CANON Cruise

- Still unclear if drifter should be deeper than 25m.
- Will oxygen sensor be necessary?
- CANON meeting Feb 16 should answer these questions

3G planning

- We will be doing dead-end filtration, although types of filters depends on volume and bugs. All extractions have been on Durapore; haven't tested Supore.
- Bead beating is best for RNA and DNA extraction; works best at room temp--have not tested yet at cold.
 - all testing has been on ribosomal targets. Started testing functional genes, and 2 tested so far are in very low abundance. Now waiting to get more from Vanessa.
 - All-Prep kits outperforms all others at overall nucleic acid extraction. Does better at DNA than DNeasy, but RNeasy gets more RNA than all-prep.
- At Lab Automation next week look at two things:
 - filtration and lysing in same step. CAN be done on same filter?
 - look for how people move fluids around. Important for size fractionation, filtering of lysate, etc...
- Much discussion about who 'owns' the injection loop to analytical module.
 - What volume needs passing? is it fixed, or could it be different depending on module needs? must we 'condition' the sample before handing it off? who cleans the loop?
- Our sample volume and how we break things really sets us apart. After that, the extraction and handling is very similar to the rest of industry.

ESP 'Science' Mtg

Frackers

1. Found that RNA quality is good enough to run microarrays; RIN numbers look good, but still unsure if 'bad' numbers would result in poor microarray results. Unclear what the future is with these results.
2. Current extraction testing has been on 16s gene; must test functional genes and Chris P getting p/p for rbcl, AOAA, and Roseobacter. Hope to have two finished this week. If these work, Chris has multitude of questions to move forward. Looks like enzymatic lysis will not work for RNA; works great for DNA, but too slow for RNA, allowing RNases in to destroy RNA before complete lysis.
3. Elif has finished standard curves for pier deployment and is now crunching the numbers.
4. Gordon
 - a. almost completely cleaned. Seems like o-rings are culprits with 10^4 DNA copies hanging out in the top and 10^3 in bottom on collection  side.
 - b. NEO
 - i. same issues. Roman has helped develop a cleaning protocol, and we now know where to look first when heavily contaminated.
5. To run BASIC event detection (i.e., threshold crossing) Brent needs to test the new Ruby interpreter. This will be installed on NEO this week after Roman fixes bearing and leak.

Particle Concentrators

1. Still waiting to hear from Kia. Jim will ping him.
2. We have settled on dead-end filtration, but may not be constrained to circular form factor, just similar surface area.
3. Is size-fractionation still a requirement? Yes. it is one of our three operational-use scenarios.

Cawthron Deployment

1. Email sent to Chris Cornelisen. Ideas:
 - a. deployment will be May 1-31, 2012
 - b. must get two cores to Cawthron by April 2 to have time for set-up.
 - c. Kevan has sent list of targets we are proposing to go with.
 - d. MBARI will be paying for reagents/assays, but Cawthron should buy directly from Spyglass to mitigate customs issues.
 - e. post-deployment runs to be performed AT Cawthron.
 - f. Doug developing a shipping option for the cores which will be 'dry-shipped' via air freight.
2. We have only 1 ISUS and it will be going to NZ.

Other Items

1. Do we need permits to put ESP on pier in Newport Beach/Orange County?
2. Passports--everyone check that your's are up-to-date. Kevan has checked and Visa is not needed for New Zealand.
3. We need some hard dates related to G3 development so people can plan their lives, and we can work development around the many deployments.
4. Need to find out what depth Drifter needs to be at for Sept CANON cruise. Currently have 1 25m cable. If they want an oxygen sensor on CTD, they should buy (or we'll split it with them)
5. We are having 4 E/M cables made. Two 15m (finished) and two 25m (in queue to be built)

2013 Deployments

This page last changed on Jan 22, 2014 by [jbirch](#).

ECOHAB/CANON--So. California

March 7, 2013

Rented 12' open U-Haul trailer loaded with all mooring gear. Pulled with F-350 passenger van.

Outer Shelf (~5 miles offshore)

ESP-Bruce, CTD w/ optode, no ISUS. Only running HAB/DA

At 10:15am on March 7, 2013, water depth was 52.5m.

Top of can as measured by divers was 24m

Boat position at deployment: 33.58553 -118.03752

Melo satellite tracker position 33.58542 -118.03747 (IMEI #300234060014550)

In-shore (~3 miles offshore)

ESP-Mack, CTD w/ no optode, no ISUS. Only running HAB/DA

At 11:40am on March 7, 2013, water depth was 28m.

Top of can as measured by divers was 8.2m

Boat position at deployment: 33.60612 -118.02133

Melo satellite tracker position 33.60621 -118.0214 (IMEI #300034012090780)

Minor problem with comms upon deployment; difficulty establishing a connection. Seems to have 'fixed' itself.

Divers: Eric Castillo, Steve Lang, and Andrew Solomon

April 3, 2013--Mack's heater fails to respond. Full current but no temperature increase. Mission over. Try to salvage some runs by running final filters as 'archives'...

April 7, 2013--Bruce started having sticky puck issues, and on this day we lost comm's to the instrument. MELO reports it's still in position, but there is no communication. Mission ended.

April 11, 2013--Recovered both instruments. Returned to MBARI via flatbed.

Dives: Eric Castillo, Steve Lang, Chris Glaeser

D-ESP on MARS cable

April 18, 2013--Deployed D-ESP with CTD, ISMS, and Sediment trap. First sample successfully fired on April 19.

Dec 2, 2013--Fired off final sample. Recover slated for Dec 11, 2013. Ran a total of 24 samples, each with an archive.

Dec 11, 2013--Successful recovery. Sable never fired, and significant corrosion around ISMS intake, but overall looks very clean. (later learned old firmware in Sable never turned off GPS; batteries dead upon recovery; as of Jan 22, 2014, Xeos was sending USB dongle to reprogram the firmware...)

Puget Sound

Lummi Bay:

June 20, 2013--Deployed Univ. British Columbia ESP at the Lummi Bay aquaculture site. Data streamed here:

http://www.nwfsc.noaa.gov/research/divisions/efs/microbes/harmful_algae/lummi_live_data.cfm

July 19, 2013--Recovered UBC ESP from Lummi (called ESPubc)

July 21--Deploy NOAA ESP at Lummi (called ESPFriday). Lost comms to this machine on Aug 1. Annie going to investigate. Subsequent investigation found that modem card had been cancelled with T-Mobile due to NOAA miscommunication. When new one was tried, operator did not know to 'close the door' on the modem in order to power the card. Brent flew up and fixed. Missed 4 days of sampling.

August 18--Lummi Bay deployment ended. Machine returned to NOAA.

Samish Bay:

July 16, 2013--Deploy MBARI ESP-Gordon at Samish bay @ Taylor Shellfish Farm. No CTD. Both machines have MFB and PCR. Media event was July 18.

Aug 14--Recover Gordon

Aug 17--Deploy (swap) NEO.

Sep 10--processing syringe servo motor has failed. Decision to run out remaining mission with archive only.

Sep 16--NEO's mission ends. NOAA to recover and Roman/Kevan retrieved both machines Sep 25.

ECOHAB/CANON--Monterey Bay

September 10, 2013-- Deploy 2 ESP's in Monterey Bay. First time in southern part of bay.

'North'

ESP-Mack. Lat 36.9048, Long -121.93659, Water depth 32m, Can depth 9.8m.

Oct 11, 2013--Battery voltage dropped too low, and we had to end mission

'South'

ESP-Bruce. Lat 36.63908, Long -121.87884, Water depth 60m, Can depth 4.8m

Oct 10, 2013-Found 'terminal fluid retention' on processing side-pulled an oring or some type of leak. Tried porting waste to Waste2 (known to be empty), but same results. Final 3 samples to try and collect for SEM work.

October 21, 2013 -- Recovered both instruments

2014 Deployments

This page last changed on Nov 18, 2014 by [jbirch](#).

SCCWRP--San Diego

Originally to begin Jan 14, 2014, but SCCWRP did/could not install pier pump. Sampling began?? and ended ~ week later when pump tore from piling.

March 5, 2014

ESP-NEO w/ MFB10. Running WCR and water quality PCR probes
Located at [Ocean Pier](#) (extension of Niagara Ave, San Diego).
Original schedule is [here](#).

Sept 25

ESP-NEO returned after being stored in (un-airconditioned) shed, unopened since above date. Bleach had leaked and corroded all internal components.

Catalina Island--Moore Applications-Jed Fuhrman

March 18, 2014

ESP-Moe, no PCR. Mostly WCR with some BAC arrays
Mooring details [here](#).

MELO used was #300034012090780

location reported by MELO was-- 33.4865 -118.51285

March 20--lost comms

March 21--re-established comms and think problem in E/M cable.

March 22--lost comms

April 3--small boat to buoy to test E/M cable

April 8--'rescue' mission. Swapped E/M cables and repositioned in slightly deeper water, at 33.48504 -118.50988

water depth 175m. top of can 10.9m

RECOVERY--see below

ECOHAB--S. California

April 1--Instruments deployed

MOE--inshore at 33.60779 -118.01877 with ISUS

Melo was 300234060014550

avg can depth ~9m

Bruce--offshore at 33.58609 -118.03686

Melo was 300234060016190

avg can depth ~19.5m

~ **April 9** lost communication with Bruce.

April 15--Rescue mission w/Nerissa found 'hung' modem. Power cycled and checked cables on deck.
Re-deployed in nearby spot. Divers (Kim R. & George M) measured 17.7m to top of can, 25.3 m to master link.

RECOVERY--Plan was to pull ECOHAB April 30 with LBA0P divers off Nerissa, Catalina with Wrigley divers off Yellowfin May 1. April 30 had horrible Santa Ana winds; motored offshore to Bruce, and too rough. Cancelled entire day. Would try next day as winds supposed to die. Met at 5am and decided to cancel again, as winds were still blowing. Drove to Long Beach, and no wind up there. Salvaged that day by rounding up crew and wrigley divers after initially cancelling and heading over about noon. During that time, Dennis (skipper of Yellowfin) agreed to go the next day (Friday) to retrieve the two ECOHAB instruments. Eric Reinecker came down from MBARI, joining Jim Citanovich from SCMI and we retrieved Mack and Bruce. Back at SCMI around 1pm. Flatbed loaded by 4:30. Returned to MBARI next day (Saturday).

Sulfur Cycling (Moran)--Monterey Bay

Sep 15--Instrument deployed

ESP-Gordon--at 36.83113 -121.91114 (M0) with ISUS and CTD. Forgot to start Melo (did it next day). Running archive-only mission, ended up deeper than we had hoped (~12m instead of 7-10m).

Sep 18--Went out in Paragon w/ 2 divers (Eric R & Lisa Z.). Pulled ~0.5mi toward M0. Now at 36.83480 -121.89800 at 5-8m. Sampling has resumed.

Oct 15--Recovered all equipment.

3G ESP Prototype flight on Makai

Nov 4--Makai deployed with one WCR cartridge. Surveyed area during that afternoon and morning of next day, fired cartridge. Recovered vehicle

Nov 5.

2015 Deployments

This page last changed on Mar 28, 2016 by [jbirch](#).

SCRIPPS-Lab Run -- ESP-Waldo

April 27, 2015

Roman delivers ESP Waldo to Andy Allen's lab at JCVI. Idea was to collect archived sample twice/week for ~6 months to test longevity issues with filters.

mid-June, instrument started losing comms to elevator dwarf. Roman sent down to replace dwarf on June 29-30. Re-canned and restarted mission.

RECOVERY

Roman recovers ESP-Waldo October 6, 2015.

ECOHAB -- Monterey Bay

Two instruments, one north, one south.

May 11, 2015

Deployed ESP-Mack w/ CTD in southern location. Running HAB/DA only.
Can depth ~4.2m but wide tidal swings.
Location: -121.8789 36.6393

Transit north but weather turned very windy and could not deploy ESP-Bruce. Divers: Kim R., Paul C.

May 12, 2015

Left Santa Cruz and Deployed ESP-Bruce w/ CTD in northern location. Running HAB/DA.
Can depth ~ 6.0m
Location: -121.9364 36.9047

Divers: Paul C., Jeff Sevadjan

[RECOVERY](#)

June 8, 2015

Kevan and Roman (along with Pascal Craw) recovered North (Bruce), then South (Mack) then back to Moss Landing (2:00pm) for unload. Divers: Eric R, Jeff Sevadjan

1st MAKAI flight w 5 cartridges

July 22, 2015

Flew triangle pattern after launch. Makai found chlorophyll feature, and we fired two cartridges while flying through. First cartridge may have had sticky valve and stayed in by-pass (filtered 1L in ~20 minutes; too fast). Second cartridge seemed to have worked.

Some issues with ESP not communicating it was on, and then LRAUV not turning it on. Went to recover vehicle late July 23, but did not surface until mission timed-out, after we were already ashore. That was when we discovered the comms issues. Fixed one, tried to fire during a 'night operation' Thursday evening. Discovered Friday morning a second comms issues, which was fixed, and fired the 3 samples during day on Friday, July 24. Did keep-station all weekend, and recovered LRAUV early Monday morning (July 27).

Results:

1. Cartridge #1 bypassed 1L (toroid valve stuck; sea water ran through instrument in bypass mode; 7 minutes); flying through feature (chl=3.0 ug/l; 10.97m)
2. #2 filtered 815.8ml; flying through feature (11.03m; chl=3.3 ug/l; took 53 minutes)

3. #3 filtered 802.3ml; within feature (13.8m; chl=3.02 ug/l; took 51 minutes)
4. #4 filtered 759.6ml, above feature (7.1m; chl=1.11 ug/l; took 50 minutes)
5. #5 filtered 809.1ml, below feature (19.4m; chl=4.24 ug/l; took 51 minutes)

Excellent summary paper by Yanwu Zhang about what the LRAUV did during this deployment--[here](#).
(check your download folder)

SCRIPPS-Del Mar Mooring -- ESP-Waldo

November 12, 2015

Roman and Scott drive down Nov 8 and work for the week to assemble mooring. Goes in water on the 12th (check ESP-Waldo channel on Slack for pictures). Setup has SCRIPPS modem as master mooring controller. when it sends command string to ESP, ESP and ESP-modem awake, which allows us to get into ESP for diagnosis and large data transfers. At end of sampling, ESP and it's modem goes to sleep. Currently (Dec 1) using [this](#) sampling schedule.

Dec 6, 2015

I2C error has stopped our sampling mission. ESP now providing only CTD updates. Brent's message: "The problem that surfaced first last Wednesday has recurred and is not going away this time.

Waldo's ESP host can access the sleepy microcontroller to get can status, etc., however, sleepy cannot access anything on the I2C bus."

Dec 14, 2015

I2C bus was back online! Instrument had been left 'on' since last communications, and had some rough weather over this weekend. Brent was able to get in and unstick the hand then take a 'flawless' sample. Will see how she works in four days...

Recovered Feb 4, 2016.

MAKAI flight w 4 Archives, 1 Lyse-n-go

Dec 18-21, 2015

Launch/recover from MLML rib boat. Multiple failures with LRAUV; difficulty holding (shallow) depth, thruster errors. Original idea was to find a chl feature, take 2 archives. Dive below feature, take two archives. Reacquire feature, fire off I-n-g. With multiple vehicle errors and time running out (Holiday break; people leaving) we got one shallow archive, one deep, and ran the I-n-g deep. No feature ever found--very stormy and little stratification. Brett, Brian, Chris P on deployment; Brett, Ben, Jim on recovery.

2016 Deployments

This page last changed on Dec 21, 2016 by [jbirch](#).

MAKAI flight w 4 Archives, 1 Lyse-n-go

Feb 2-4, 2016

Repeat of Dec flight. Here are notes from Yanwu's summary:

(Note: when reaching each target depth (peak-chl or pre-set), we give Makai 10 minutes to damp down depth undulation.)

Sample#1 (lyse&go sample. At chl peak):

Makai descended from surface, found the chl peak at 8.7m. On the ensuing ascent, Makai held depth at 8.7m, and triggered sample#1.

Took 63 minutes to complete. Then Makai surfaced to "report to shore".

Sample#2 (archive sample. At chl peak):

Makai descended from surface, found the chl peak at 12.7m. On the ensuing ascent, Makai held depth at 12.3m, and triggered sample#2. (Note: the water column was quite mixed vertically. The chl values at 8m and 12m were very close. Makai was doing her best to pick the relatively weak peak.) Took 41 minutes to complete.

Sample#3 (archive sample. At reacquired chl peak):

In order to reacquire the chl peak (considering the peak-chl layer may have moved up or down), Makai intentionally wiggled up and down (up first, then down, and then up). On the "down", it found the chl peak at 13.2m. On the ensuing "up", Makai held depth at 13.0m, and triggered sample#3. Took 40 minutes to complete.

Sample#4 (archive sample. At pre-set 27m. Control sample.):

Makai dove to the pre-set 27m depth, and triggered sample#4. Took 39 minutes to complete.

Sample#5 (archive sample. At pre-set 27m. Control sample.):

Makai stayed at the pre-set 27m depth, and triggered sample#5. Took 38 minutes to complete.

Del Mar--ESP-Waldo

May 17, 2016

Used M/V Merlin (Walt Crampton), with MBARI surface mooring. Divers from SCRIPPS. Deployed with CTD about 400 yds from Del Mar mooring (SE of their mooring). Used new anchor line, #1 shackle, and 35m EM cable.

Ship coordinates when we dropped it: 32' 55.603N 117' 18.895W

Melo coordinates (IMEI: 300034012090780): 32.92633 -117.31491

Water depth 100m. Divers reported master link at 22.8m, can top at 16.76m. CTD reading ~18m.

Initial mission is to take a sample two hours after sunrise, every weekday.

Nov 10, 2016

Recovered ESP-Waldo. used M/V Merlin with Scripps divers. Drove home with 5'x9' trailer w/ramp using MBARI van #4.

ESP-Moe; Moran in Monterey Bay

Sep 26, 2016

After two-day wait for weather to settle, deployed ESP MOE at M0. No mission loaded, as they wanted to manually fire each archive and have more control over when they would manually collect samples.

Shana Rae used, with Charles Bock & Mike Conway diving. 15.6m EM cable with Shackle #2. CTD is around 5.65m deep.

Oct 7, lost comms to Moe. Modem and Cell provider check out. Electrical signal up/down EM cable check out. Oct 11 bring out computer to see if we can talk to can. no luck.

Oct 13, 2016

Got Shana Rae and divers (Eric + George) at the last minute. Weather beautiful. Flat. Recovered instrument on deck, and tried three ways to tunnel in to talk to host. No luck. Brought instrument home and could not communicate with host after uncanning. Scott traded carrier board with one in Brent's office and it worked. Moe carrier board did not work on another Sleepy. Work continues to discover why/ what went wrong on carrier board.

Oct 27, 2016

Got Shana Rae and divers (Jeff S and Paul C.). Deployment went very smoothly. difficult cell phone reception at site. Got confirmation of depth (6.7m) and started home. After about 15 minutes got call from Brent that carousel was jammed and would not turn. Suggested recover. We returned and recovered and brought everything home. inspection showed that a carousel rod had unscrewed itself, fallen, and jammed against the elevator, freezing the carousel. Weather is turning more mercurial; will try to redeploy on Wed, Nov 2.

Nov 2, 2016

Got Shana Rae and divers (Jeff S and Mike C). Deployment went smoothly, although had to wait for fueling of WF on dock. Left 11:30am, returned ~3pm. Depth 6.5m. This will be a 2-week run.

Nov 17, 2016

Textbook recovery of ESP-Moe, ending the Moran deployment. Used Shana Rae w/ divers, George & Kim R. Left dock at 8:20am, returned ~11:00. Some swell and coolish/cold.

3G ESP in Monterey Bay

Dec 14-19, 2016

Perform 5-cartridge depth/pressure testing in MB. Launched Makai with Honu; mission was to sample at chl max, 50m, 100m, 200m, and 300m. Sent vehicle up off Davenport to find deep enough (but not too deep) water for tests.

Results:

Dec 15

First cartridge fired ~8am at chl max (~14m) with avg chl 1.9ul/l. Took 45 minutes to sample 1L.

Second cartridge (50m) fired (~3:20pm) and took 57min.

Third cartridge (100m) fired (~6:36pm) and took 35min.

Dec 16

Difficult keeping on station, but started 200m cartridge ~8:27pm. Vehicle timeout caused vehicle to cut power to ESP after 60min, before ESP was finished sampling.

Dec 17

Difficulty finding 300m water within the vehicle timeouts. Vehicle dropped weight on a return to surface, as it thought it was taking too long. Also, Rowe (ADCP) caused a computer re-set just before sampling was to commence. Difficult day....

Dec 18

Turned off ADCP. In slightly deeper water and successfully fired off sample. Vehicle recovered next day.

Post-recovery summary by Chris Preston:

Upon startup in the lab, the PV could not reach home and pinned the SC. It did not properly home. This likely occurred during the sampling of the 300m sample. Cartridge summary to follow: [11:37] Cartridges

run at 14m, 50m and 100m all sampled and preserved correctly. No indication of bubbles upon inspection. For these cartridges ran archiveEvac to clear out RNAlater in puck.

;

Cartridge run at 200m timed out before sampling completed. Did not get command from Makai to process the sample, thus it was not fixed. Back in the lab, ran archiveEvacAUV (full RNAlater fix procedure). No indication of bubbles introduced during sampling.

;

Cartridge run at 300m sampled for 15min correctly, Honu received commands from Makai to process.

ESPhonu failed to actuate the PV and thus the sample was not preserved. Ran archiveEvacAUV. No indication of bubbles introduced during sampling. My best guess is that the carousel wasn't aligned properly and that the PV managed to get jammed upon actuation. This is the state that the instrument was in when it was brought to the lab.

;

So, Makai-ESPhonu sampled at all depths... 3/5 samples preserved.

2017 Deployments

This page last changed on Jan 29, 2018 by [jbirch](#).

AKU flight w ESP-Honu and 5 Archive Cartridges

Apr 15-18, 2017

This was flight to coincide with the CALCOFI ship, the R/V Shimada. We were to take a sample at the chl-max near the ship while they did their CTD cast. These two filters would be compared. Multiple problems with LRAUV and ESP. LRAUV launched on Apr 14 without a wet-test of the mission. That afternoon vehicle sounded its water alarm (water in payload section). Brett braved weather and recovered that afternoon but considerable damage to vehicle. Stayed late that evening and repaired.

Next morning (Saturday, Apr 15) Scott, Kevan, Brett, Jim opened Honu. 5-10 ml of water present. Eventually discovered loose swagelok fittings upstream of the bulkhead valves. These tightened, and we raced to make the Shimada rendezvous. Met north of M1, and put vehicle in water. took ~2 hrs for mission to finally load and begin; Shimada had drifted 500m to our southwest when sampling took place. Multiple vehicle/instrument issues after that; poor communications to vehicle. Incorrect cartridge volumes used the protocol so syringes kept bottoming-out. Vehicle recovered Apr 18. Three filters recovered; chl-max, and two at 10m. ?

Del Mar w/ ESP Waldo

Apr 18, 2017

Deployment for Jon Zehr. Employed M/V Merlin with Walt Crampton and Jared ? Divers from SCRIPPS with Rich Walsh. Van 4 with 5'x9' Uhaul w/ramp trailer.

Used ESP-Waldo sitting ~10m. Two battery cans and CTD. MELO worked sporadically for 2 days, then stopped. Last location said:

32.93592 -117.31748

which places it north of the Del Mar buoy (see attached [map of prior year deployments](#) from Uwe Send).

Jun 6, 2017

Rich Walsh of SCRIPPS went to buoy and swapped the non-working MELO with a newer one that we had sent down. We are now getting hourly (correct) positions.

Sept 6, 2017

Final recovery of Waldo.

AKU flight w ESP-Honu and 5 Archive Cartridges

Apr 27- May 8, 2017

This was part of a 5-vehicle launch (Tethys, Daphne, Aku w/ ESP Honu, Ahi, Opah). Gabe Foreman arrived from UH to help with piloting. Adam Jones helped launch Aku and Opah.

Ran multiple simulation to test the mission.

On Weds, May 3, tried first 'real' concurrent sampling. Cartridge 1 threw an alignment error--could not push on plunge valve. We labeled that cartridge 'wet' and moved to cartridge 2. But this notification not written to file, and was lost when power was cycled. Thus, we thought we were onto cartridge #2, but in reality were on #1 (which started working....). Sampling was as follows:

All cartridges started filtering at 60m depth while vehicle ascended to surface, where filtering stopped. WF took CTD casts in the same area at same time. Kevan took 2L each from each of these bottles: 60m, 40m, 20m, 10m, surface and mixed the 10L in a carboy. From that carboy, he sampled 1L through

a cartridge on tackle-box, and 1L (x3) on peristaltic. Sample #2 had 1L (x3) through the tacklebox cartridge. Francisco took 1L from each of those depths and peristaltic filtered.

Because of the cartridge number mix-up, Honu returned with a dry #5 cartridge, which we ran as a negative control in the lab. Investigation of the alignment issues is ongoing.

Summary of 3G flights to this point (Dec 2017):

Nov 2014

Very first 3G flight. Makai with one Archive cartridge. Mission lasted ~3 days.

July 2015

First 5-cartridge flight on Makai. All Archive. Cartridge 1 toroid valve stuck in bypass mode, thus recovered only 4 sample filters. All collected <20m deep.

Dec 2015

First 4 & 1 (archive/LnG) flight on Makai. Many vehicle errors. No stratification so difficult to find any 'features'. Acquired 2 archives and 1 LnG. rough weather recovery. I don't have actual collection depths for these three samples.

Feb 2016

Repeat Dec flight. 1 LnG fired first, then 4 Archives on Makai. Samples taken at 8.7m, 12.7m, 13m, 27m, and 27m.

Dec 2016

Depth testing with Honu in Makai. 5 archival cartridges. Fired at chl max (~14m), 50m, and 100m. 200m cartridge started, but vehicle cut ESP power before finished. 300m sample had carousel alignment issue and did not complete. 3 of 5 samples preserved.

Apr 2017

5-archival mission. Honu on Aku; meet with R/V Shimada (CALCOFI ship). Difficulties with water in payload section and rough recovery. Three filters recovered (chl-max to compare to Shimada's, and two at 10m)

Apr 2017

5-archival mission. Honu on Aku; CANON cruise and WF rendezvous. Alignment problem had us bypass (so we thought) cartridge #1. Four archives collected, two a smear from 40m to surface, two from 60m to surface. These are matched to ship samples Kevan collected.

Dec 2017

First 60 cartridge-archival mission. Koa on Makai; Deployed Dec 12, recovered Dec 19. Toroid valve motor did not function. No field samples collected. First try and 5 'blocks' of behavior.

Overall, we have 21 archival filters that correctly filtered and preserved samples; two LnG samples were collected (were both run through SPR on the vehicle?)

Makai flight w ESP-Koa and 60 Archive Cartridges

Dec 12 - 19, 2017

We decided to generate 5 'blocks' of behavior (below) each testing a certain collection scheme, with replicates. Combined samples for Ed with samples for eDNA work.

Out of 60 cartridges, 15 are controls (9 pre-experiment + 6 post-experiment); 45 will be fired offshore. The 45 field samples are divided into 5 blocks, each block containing 9 samples. In each 9-sample block, firings are in triplicate bursts: 1, 2, 3 in one continuous burst; then 4, 5, 6; and then 7, 8, 9.

Scientists and engineers will jointly select appropriate sampling locations in consideration of oceanographic features as well as LRAUV operation safety.

Block 1 (Bathymetry alert due to deep sampling):

Mission files:

chlpeak_sampling_InAboveBelow.xml, in donut mode.

depth_sequence_sampling.xml

First, vehicle transits to M1-northeast: 36.760, -122.012

Then, kick off mission, setting waypoint to M1. Vehicle will do an horizontal search for high chl between M1-northeast [36.760, -122.012] and M1 [36.750, -122.022]; set the hi-chl spot as the sampling location; run a cylinder around the sampling location

Run chlpeak_sampling_InAboveBelow.xml:

3 samples at vertical chl peak depth

Then, run depth_sequence_sampling.xml:

3 samples at 100m depth

3 samples at 250m depth

Total: 9 samples, ~15 hours (presuming 1hr filtration time + 0.5hr processing time for each sample + initial horizontal hi-chl search and cylinder time).

Block 2 (Bathymetry alert due to deep sampling):

Mission file: smear_sampling.xml, in donut mode, on the first 3 samples.

Mission file: depth_sequence_sampling.xml, in donut mode, on the remaining 6 samples.

3 samples smearing between 5m and 100m depths

3 samples at 100m depth

3 samples at 5m depth

Total: 9 samples, ~14 hours (presuming 1hr filtration time + 0.5hr processing time for each sample)

Block 3:

Mission file: isotherm_sampling.xml, in donut mode.

Initial horizontal search for high chl in local area; set the hi-chl spot as the sampling location; run a cylinder around sampling location

3 samples at the temperature corresponding to the vertical chl peak.

3 samples at chlpeak temp - ΔT_1

3 samples at chlpeak temp + ΔT_2

Total: 9 samples, ~15 hours (presuming 1hr filtration time + 0.5hr processing time for each sample + initial horizontal hi-chl search and cylinder time).

Block 4:

Mission file: chlpeak_sampling_InAboveBelow.xml.xml, in drift mode.

Initial horizontal search for high chl in local area; set the hi-chl spot as the sampling location; run a cylinder around sampling location

3 samples at chl peak depth

Vertical perturbation to reacquire chl peak

3 samples at chl peak depth

Vertical perturbation to reacquire chl peak

3 samples at chl peak depth

Total: 9 samples, ~16 hours (presuming 1hr filtration time + 0.5hr processing time for each sample + initial horizontal hi-chl search and cylinder time + vertical perturbation time).

Block 5:

Mission file: depth_sequence_sampling.xml, in donut mode

Scientists determine a horizontal feature, and set a certain depth for sampling

3 samples at the set depth on one side of feature

3 samples at same depth in feature

3 samples at same depth on other side of feature

Total: 9 samples, ~16 hours (presuming 1hr filtration time + 0.5hr processing time for each sample + transit time)

Vehicle recovered Dec 19, and discovered pulled wire on toroid valve. Toroid pins never moved, so each sampling event pumped through ring (thus the constancy in filtering times). All filters were preserved with RNALater, but none had any biomass. Severe disappointment. Next flight will be late January 2018.

2018 Deployments

This page last changed on Sep 13, 2018 by [jbirch](#).

3G Koa on AKU in Monterey Bay

Jan 24, 2018

Deploy Aku with Koa and 60 cartridge archival mission. Collecting ~32 samples for Ed and Kevan (eDNA), then running remainder (~19) as engineering tests with 20 minute filtering time-outs.

Hawaii MiVEGAS cruise on R/V Falkor

Three ESP instruments delivered: ESP-Koa, MV1, MV2

Three LRAUV were delivered: Opah, Aku, Ahi

They were paired as

Opah-no ESP (just CTD instruments)---during both legs, Opah flew recon in loops around sampling instrument (or tried to).

Aku / Koa

Ahi / MV1

MV2 was installed on bench in Falkor lab

Leg 1: March 10-22, 2018

Ahi/MV1 was first to launch (Mar 11), and was pulled under ship and damaged. Recovered ~2 hours later.

Launched Aku/Koa. sampled Mar 17-Mar21. Collected 38 field samples - of those 1 failed - leaked, 1 smeared.

Leg 2: March 27-Apr 10

Aku/Koa used again. sampled Mar 28-Apr2. Collected 56 field samples--of those 8 leaked (no sample), 1 smear.

2G on Yellowstone River

Deployed the following on **July 25, 2018** for full carousel of archives:

ESP-Gordon -- Livingston (Carter's Bridge). 45.597148, -110.566021

ESP-Waldo -- Corwin Springs. 45.111612, -110.793943

Recovered both instruments **Sept 5**.

3G shakedown in MB for L. Erie

Aug 2-6, 2018

First multicartridge L&G flight with SPR in MB.

3G in L. Erie

Aug 20-Sept 4, 2018

We arrived and started building instrument Aug 20. Sent in water Aug 23. Recovered Aug 26 and redeployed 27th. Ran Makai with Koa and 14 L&G cartridges and SPR module; remainder were archival.

3G Tacklebox in Teton Valley

Sep 10-12, 2018

Collected 5 samples (Flat Creek, confluence of Cache/Flat crk, South Park Flat Creek, Fish creek, pond on South Park Flat Creek). tested in situ for E. coli. 3 positives (but Ct's were 36-38, so low copy numbers). Collected hand sample along with 3G ESP sample. Used the Freedom 4 PCR module, hand-feeding it lysate created from our L&G cartridges.

2019 Deployments

This page last changed on May 09, 2019 by [jbirch](#).

Scott Creek eDNA

March 25, 2019 -- Deploy ESP-Waldo at Scott creek with 132 archival pucks. Initially will sample 3 times/day (6am 12pm 6pm), but that will change. Powered by Jensen's homegrown solar array.

May 6, 2019 -- Recover ESP-Waldo, and replace with ESP-Moe.

2G ESP GUI Application

This page last changed on Dec 02, 2014 by [kgomes](#).

Current Applications

1. [Web application](#)
2. [Image Analysis](#)

User Documentation

1. [Image Analysis Application](#)
2. [Image Analysis Automation](#)

Design Documentation

1. The goals for the ESP GUI Application are:
 - a. A graphical interface to allow the user to plan a mission for the ESP
 - b. The GUI can take a mission plan and generate a valid mission script to deploy on the ESP
 - c. The GUI will provide functionality to manage the data from the ESP. This data consists of:
 - i. Various Ruby scripts
 - ii. Image analysis of the probe arrays
 - iii. Ancillary instrument data
 - iv. Events and data from log file (parsing)
 - d. The GUI will provide a visual representation of the state of the ESP
 - i. Currently user has to look through log file and mentally visualize state of system
 - ii. GUI should display visual representation of the instrument and its components
 - iii. Take instrument state from log file and produce graphical representation that will depict the current state of the instrument
 - iv. The state visualization should be able to playback a mission run from a log file and step the user through instrument states
 - e. The GUI application should be focused on transitioning the ESP to a user community (not necessarily a development community)
2. Use Cases
 - a. ESP Configuration In Lab
 - i. Mission plan is created
 - ii. Pucks are loaded
 - iii. Reagents are loaded
 - iv. Mission script is loaded
 - b. ESP Deployment
 - i. Shore station is configured
 - i. Nothing from a GUI perspective
 - ii. FTP file store is configured
 - i. Once the FTP server is up and running, the user will log in to the ESP web site
 - ii. If no mission has been created, the user creates a new mission for the ESP (can be empty)
 - iii. The user configures the mission FTP server in the web application
 - i. Protocol (FTP/SFTP)
 - ii. Server hostname
 - iii. Port number
 - iv. Base directory for deployment files
 - v. Username (or anonymous)
 - vi. Password (or email)
 - vii. Name and location of the log file (default is deduced from the type of mission e.g. real -> real.log)
 - iv. The user saves the FTP configuration in web application

- v. The user logs out
 - vi. Server spins up a monitoring worker process that points to the FTP server configured for the mission
 - vii. Process crawls FTP server site and examines each directory and file
 - viii. If the directory/file is different that what is in the deployment directory in the ESP repository, sync file from FTP server to repository.
 - ix. Update catalog entry for directory/file
 - x. If the log file was updated, spin up process to parse the log file.
- iii. ESP mobilized on ship
 - i. Verify the ESP if functioning properly by checking files on the FTP station
 - i. Make sure ancillary instruments are logging
 - ii. Check for any errors
 - iii. Makes sure environment sensors are reporting that all systems are go (humidity, power, etc.)
 - iv. ESP deployed
 - i. Monitor ESP log files during deployment as was done in mobilization.
- c. ESP Operations
 - i. ESP is sitting idle
 - ii. ESP processes sample
 - iii. ESP errors and halts
 - iv. Operator interacts with ESP
- d. ESP Data Analysis
 - i. User enables image analysis
 - i. The proper GAL file is uploaded to the mission repository
 - ii. The application sees the GAL file and does an automated analysis of the images.
- e. ESP Recovery
 - i. Recover ESP with ship
 - ii. Demobilize the ESP off the ship
 - iii. Decommission the FTP server
 - iv. Decommission the shore station
- 3. [Requirements](#)
 - a. [Assumptions](#)
 - b. [Glossary](#)
 - c. [Open Questions](#)
- 4. Interface Documents
 - a. [ESP Log Interface](#)
 - i. [Parsing the ESP log file](#)
 - b. [Real-Time ESP state update protocol framework](#)
- 5. [GUI Application Design](#)
 - a. [Object Model](#)
 - b. [Data Model](#)
 - c. [Data Repository](#)
- 6. [Developer Documentation](#)

Outstanding Issues

[Bug Tracking](#)

Supporting Documentation

1. [GUI Related Proposals](#)
2. [Slides From a Tour Geared towards Engineers](#)
3. [Slides from a User Manual meeting that was an overview of the ESP](#)
4. [Slides from a User Manual meeting about the Operating Environment of the ESP](#)
5. [Slides from a User Manual meeting about the users and groups in the ESP operating system](#)
6. [Slides from a User Manual meeting about the Core Libraries for the ESP](#)
7. [Slides from a User Manual meeting about I2C and its use in the ESP](#)
8. [Slides from a User Manual meeting about the servos in the ESP](#)

9. [Slides from a User Manual meeting about the slides in the ESP](#)
10. [Slides from a User Manual meeting about the Axes in the ESP](#)
11. [Slides from a User Manual meeting about the parameters used in operating the ESP](#)
12. [Slides from a User Manual meeting about contextual sensors](#)
13. [Slides from a User Manual meeting about the shore side components of the ESP](#)
14. [Slides from a User Manual meeting about errors and error handling](#)
15. [ESP Fluidics Schematic](#)
16. [ESP Users Manual](#)
17. [Glossary](#)
18. [Assumptions](#)
19. [Outstanding Questions](#)
20. [ESP Java GUI](#)
21. Original [ESP GUI Users Guide](#)

Meeting Notes

1. [06/06/2007 PDR](#)
2. [06/11/2007 Meet with Chris](#)
3. [09/05/2007 ESP GUI Demo and Questions](#)
4. [09/07/2007 Scholin email](#)
5. [01/08/2008 Resources and Consumables](#)
6. [03/11/2008 Mock Mission Planning Meeting](#)
7. [01/22/2009 GUI Team Meeting](#)
8. [01/11/2012 GUI Update and Planning Meeting](#)

Presenations for GUI Development

1. [6/6/2007 PDR Powerpoint slides](#)
2. [6/6/2007 PDR Work breakdown spreadsheet](#)

Minutes from ESP GUI Demo and Question and Answer Session

The purpose of this meeting is to show the progress to date on the ESP Data Management/Planning GUI and to use this demonstration to foster information gathering that can be used to both direct development and answer development questions.

This is the list of all possible consumable resources:

1. Instruments:
 - a. Darlene
 - b. GIGI
 - c. NEO
2. Lists of phases, protocols
 - a. HAB
 - i. SH1
 - ii. lyfil
 - iii. SH2
 - iv. WCR
 - b. DA
 - i. DA1
 - ii. Dalyfil
 - iii. DA2
 - c. BAC
 - i. SH1
 - ii. lyfil
 - iii. SH2
 - iv. WCR
 - d. invert
 - i. SH1
 - ii. lyfil
 - iii. SH2
 - iv. WCR
 - e. BACAR
 - i. WCR
 - f. QC
 - i. WCR
3. Details for phases:
 - a. Max duration
4. Details for protocols:
 - a. Duration
 - b. Delay to sample
5. Consumable Types:
 - a. Fix
 - b. AgMeOH
 - c. ab1
 - d. ab2
 - e. Lysis
 - f. Diluent
 - g. Sig1
 - h. Sig2
 - i. Sig3
 - j. Con 1:5000
 - k. Sub 1
 - l. Sub 2
 - m. Wash
 - n. CSR Flush
 - o. CSV Flush
 - p. PSR Flush

Agenda

1. Introduction/Recap
2. Demonstrate GUI to date
 - a. How to start it. Click here: http://predator.shore.mbari.org/esp_gui/launch.jnlp
 - b. Should work on Java 1.5+
 - c. Right now you will need to be connected to MBARI intranet (that will change to local laptop installation)
 - d. Upper left is list of instruments and their associated deployment. Default start is to have all displayed.
 - i. Display selection tree functionality
 - e. Year selection drives the overview calendar displayed below.
 - f. The overview calendar always shows all deployments
 - g. Click on overview calendar to select month of interest.
 - i. This drives main calendar.

Questions to Answer

For GUI:

1. Default is to have no deployments displayed. Is that OK, or should have they all show up to begin with?
 2. Should I show all deployments on the overview calendar?
 3. Should consumables be decreasing meters and turn red on low?
 4. How much detail (zoom) do you want to see?
 5. Where do you want to edit phases/deployment (table/popup/etc.)?
- For Mission Scripts:
6. What is 'startTube' and how is it determined?
 7. What are the 'rules' around script construction?

- q. Kill
- r. Waste
- s. Power
- 6. Bags/Containers/Storage:
 - a. How big are the capacities for the above consumables?
- 7. Protocol Makeup
 - a. For each of the phase/protocol combination, what consumables do they use and how much (i.e. recipes)

New Requests From Meeting

1. Link the colors of the instruments to the deployments
2. Have the deployments disappear on the overall calendar as well as the main calendar
3. Clean up the view on the overview calendar so they don't look so busy (remove protocols and phases)
4. Darlene is no longer with us, just GG (or GiGi) and Neo. But there should be three new instruments coming on line.
5. In the details pane, there was a desire to put the sample volume right next to the protocol name.
6. When you select a protocol line in the details pane, a tab should be available to show the contextual data (CTD, ISUS) for the time span of when the sample volume was drawn
7. There was a desire to have the CTD data displayed like the tide data is displayed and some way to turn on/off view of it
8. Look into the possibility of using jruby to generate the mission script so the generation could be done outside of the planning application and changed there instead of inside the planning app.
 - a. As a side note, you need to know the start tube in order to generate the mission script and the start tube will not be known till after the instrument is loaded. Question, can't we tell the user how to best load the instrument based on the deployment configuration?
9. There was a bit of discussion on the consumables view and how to use it in the planning phase. I think the following was the resulting desire:
 - a. When creating a new plan (deployment), the consumables should simply show how much of each consumable is being predicted (ml, watts, waste generation)
 - b. Then at some point, the instrument will be 'loaded' and the view should be changed/enable that shows the amount of consumables are available (maybe also show how much is predicted to be consumed). A full load will show all progress bars as 100% (display will show appropriate units like ml or watts) and then the bars will decrease as the log file is read and the actual amounts consumed are known.
 - c. There was also a desire to know how many of the different phases could be configured with the current state of the instrument. This speaks to the 'interrupted deployment scenario' where the instrument would be recovered and could be reconfigured (but no consumables added). For example, if the instrument was recovered and it was half way through its consumption, the user could ask the application how many of the different phases could be run. This would entail changing the pucks around, but the consumables would be left alone. There was some talk about that just simply constituting a new 'deployment' since a new mission script would be created anyway.

Comments

[Brian Schlining](#) We have the database modeled to support ESP from planning through analysis. My take though is that we should create discrete applications for the different phases of the ESP deployment lifecycle (Plan, manage, analyze). There are a lot of *like to have* features so we should manage the user expectations and tell them what is possible to do in the short amount of time that we have.. We're currently focusing on the planning/script generation phase, which I think is appropriate. Everything else should be deferred until we get a solid planning app put together....just my 2 cents.

- b. AqMeOH
- c. ab1
- d. ab2
- e. Lysis
- f. Diluent
- g. Sig1
- h. Sig2
- i. Sig3
- j. Con
- k. Sub 1
- l. Sub 2
- m. Wash
- n. CSR Flush (combine with CSV)
- o. CSV Flush
- p. PSR Flush
- q. Kill
- r. Waste1 (non-alcohol)
- s. Waste2 (alcohol)
- t. Power
- 6. Bags/Containers/Storage:
 - a. For NEO, how big are the capacities for the above consumables? (max volume is 2L)
- 7. Protocol/Consumable Details (for each of the phase/protocol combination, what consumables do they use and how much?)
 - a. Excel Spreadsheet?
- 8. Mission Script Syntax (Work with Brent Roman)

Minutes from Mock Mission Planning Meeting

Questions

1. How are volumes for duplicate phases handled?

```
# Sample Volumes for Assay Types
$habVol=1000
$larvVol=900
$larvVol=700
$daVol=30
```

```
startTube 2
# require '08feb'
```

```
startAt "14:44:34 03/12/2008"
```

```
initialPurge
hab
napUntil "10:05:13 03/13/2008"
```

```
larv
napUntil "05:50:00 03/14/2008"
```

```
initialPurge
larv
napUntil "17:45:00 03/14/2008"
```

```
da
shutdown
```

2. Script gets generated but not in sync with timing of simulator/instrument, how to best synch:

```
CH.stop
I2C::MsgErr in sampler -- I2C::Servo::OffCmd Not yet modeled
I2C::MsgErr in storage -- I2C::Servo::OffCmd Not yet modeled
I2C::MsgErr in sampler -- I2C::Servo::ConfigureCmd Not yet modeled
I2C::MsgErr in storage -- I2C::Servo::ConfigureCmd Not yet modeled
CH.configure CHconfig
PH.stop
PH.configure PHconfig
Posix::Error in quick -- /dev/ctd not a character device
Starting with tube #2
delayUntil "06:15:00.00 PDT 13-Mar-08"
@06:15:00.00PDT13-Mar-08 <poll> CTD.startLogging
@06:15:00.00 <quick> Initial Intake Purge
@06:16:30.00 ==> hab 1000ml, :image=>[:hires, 160, :default, 40, :midres, :auto]
@09:46:30.00 Disinfect Intake
@09:48:30.00 Shutdown
delayUntil "13:50:00.00"
@12:15:00.00 <poll> CTD.update
@13:50:00.00 <quick> ==> bac 900ml, :image=>[:hires, 160, :default, 40, :midres, :auto]
@17:20:00.00 Disinfect Intake
@17:22:00.00 Shutdown
delayUntil "01:25:00.00 PDT 14-Mar-08"
@18:15:00.00 <poll> CTD.update
@00:15:00.00PDT14-Mar-08 CTD.update
@01:25:00.00 <quick> Initial Intake Purge
@01:26:30.00 ==> larv 900ml, :image=>[:hires, 160, :default, 40, :midres, :auto]
@04:56:30.00 Disinfect Intake
@04:58:30.00 Shutdown
delayUntil "11:20:00.00"
```

```

@06:15:00.00 <poll> CTD.update
@11:20:00.00 <quick> Initial Intake Purge
@11:21:30.00 ==> da 1000ml, :image=>[:hires, 15, :default, 4, :midres, :auto]
@12:15:00.00 <poll> CTD.update
@14:21:30.00 <quick> Disinfect Intake
@14:23:30.00 Shutdown
delayUntil "20:30:00.00"
@18:15:00.00 <poll> CTD.update
@20:30:00.00 <quick> Initial Intake Purge
@20:31:30.00 ==> hab 1000ml, :image=>[:hires, 160, :default, 40, :midres, :auto]
@00:01:30.00PDT15-Mar-08 ==> da 1000ml, :image=>[:hires, 15, :default, 4, :midres, :auto]
@00:15:00.00 <poll> CTD.update
@02:01:30.00 <quick> Disinfect Intake
@02:03:30.00 Shutdown
gui_test.rb Assays Completed. CTD logging continues ...
delayUntil "00:13:07.00"
Schedule::Error in quick -- Delay::RunEvent for @00:13:07.00 PDT 15-Mar-08 is in the past
Waiting to Resume from Checkpoint "gui_test.rb Assays Completed. CTD logging continues ... "
@06:15:00.00 <poll> CTD.update
@12:15:00.00 CTD.update
@18:15:00.00 CTD.update
@00:15:00.00PDT16-Mar-08 CTD.update

```

New Requests

1. Have capability to add comments to phases that show up in script. Maybe go out in log too. Also add header comments. (global too).
2. Modify protocol so it doesn't kill between phases (want capability to call out alternate purge).
3. Always odd things (give it ruby and time to run and it puts it in script).
4. Phases should be different colors
5. BUG: If delete last phase, can't add one at end.
6. Need to specify a way just to sequence things, not deterministic time. Or say, I just want to wait 15 minutes after it finishes.
7. Have way to call out initial purge instead of upper/lowercase

Minutes

This was a meeting that the GUI team held to get back on track for development for 2009.

Status update GUI is being used for planning and some data processing. The log file parsing is creating all kinds of issues with application deployment due to the Ruby requirements. Brent is OK with changing to log file to allow us to rip out the Ruby stuff which should fix deployment issues. Log file processing Brent was OK with us putting in log entries however we wanted. He will be tagging all log entries with an epoch seconds offset from a base timestamp further up the log file. That should work OK because we can put fully atomic log entries in our entries. Rich will work on the ruby code and Kevin will work on the GUI to consume those. Not sure how we will implement, integrate and test the changes. Kevin will talk to Brent. Image analysis Brian will be working on the ESP stuff in March and he wanted to make sure that it is known that he may only get to a point where he understands the problem based on the days he was given. He currently has software that will find spots and calculate intensity. He can find and label spots with intensity. The issue is taking the report from the filter paper print job and align the image with that map. Once this is done, the rest should move forward, but this alignment, scaling, rotation is the key issue. There are products out there that do this type of analysis, but they are commercial and proprietary. The goal of this work will be to have an image in the GUI with the spot map overlayed and a key that has the various spots and their labels with their intensity. This could then all be saved off to a text file for analysis/import. Action items 1. Kevin to talk to Brent about process for change and test 2. Rich will work on ruby so that our log entries can be included 3. Kevin will work with Rich on consuming those log entries in the GUI 4. Starting in March, Brian will work on image software.	Attendees • Kevin Gomes • Brian Schlining • Rich Schramm
---	--

Goal

This meeting is to give an update and a walk through of the ESP GUI components, to get feedback and to put out a list of requests for things moving forward.

Attendees

- Kevin Gomes
- Rich Schramm
- Brian Schlining

Agenda

1. Walk through of Planning/DM GUI
 - a. [Deployment Diagram](#)
 - b. [Starting the GUI](#)
 - c. Setting preferences (Directory is local, repo is shared)
 - d. Create new Instrument
 - e. Create new deployment
 - f. Show file pane, explain, then sync
 - g. After sync, look at PCR files
 - h. Parse log file
 - i. Tabs
 - i. ESP (dashboard connection)
 - ii. Planned
 - iii. Actual (show log file location with spanning lines)
 - iv. Images (show image, metadata, log entry)
 - v. Samples (show log entry)
 - vi. Ancillary Data (Grab Gordon, CTD, ISUS, time window)
 - i. Zoom, print, save
 - vii. Files (open in browser, refresh, push to repo)
 - j. Repository
2. Walk through Dashboard
 - a. Show work to date
 - i. Use feedback (split and view)
 - b. Talk about [Dashboard data protocol](#)
3. Walk through of Image Analysis
 - a. Demo
 - b. Show [wiki page](#) for use
 - c. Matlab

Open issues

1. Plan/Data
 - a. Need way to determine exactly which contextual sensors on on ESP (CTD, ISUS, etc.)
 - b. Need something in the log file that indicates when a DWSM inhale is done
2. Dashboard
 - a. Need to get data/simulator to start driving dashboard for development
 - b. How do we then take this protocol and persist for playback (i.e. log file entries?)
3. Image Analysis
 - a. Got what he needs to keep going.

Suggestions

1. PCR Plots need separate axes for Temp and diode data.
2. After adding assay, planned table does not update

Assumptions

This page last changed on Dec 02, 2014 by [kgomes](#).

1. The user cannot change the make up of a phase once it has been defined. If the sequence or timing of the contents of a phase changes, a new phase must be created.
2. The combination of the phase identifier and the protocol identifier is a "unique key" in determining how much of the various consumables will be used.
3. The phases will have worst case times associated with them where they could run up to, but never over, that amount of time. The default worst case is 4 hours, but some (like HABDA) could go to 6 hours.
4. The amount of waste storage available and the number of pucks are the main limiting factors.

Data Repository

This page last changed on Nov 15, 2012 by [kgomes](#).

In order to manage the data from multiple ESP deployments, a central data repository is required. This repository needs the following functions:

Requirement

1. Provide access over many protocols (HTTP, WebDAV, FTP, SMB)
2. Provide authentication and authorization to protect data from ESP deployments
3. Provide notification mechanism to alert interested parties when files change and what changes were made.

Design

1. File Notification frameworks
 - a. Node.js
 - i. [Watch-tree](#)
 - ii. [log.io](#) - For monitoring and send a single file, but might be useful.
 - iii. [watch](#)

Design

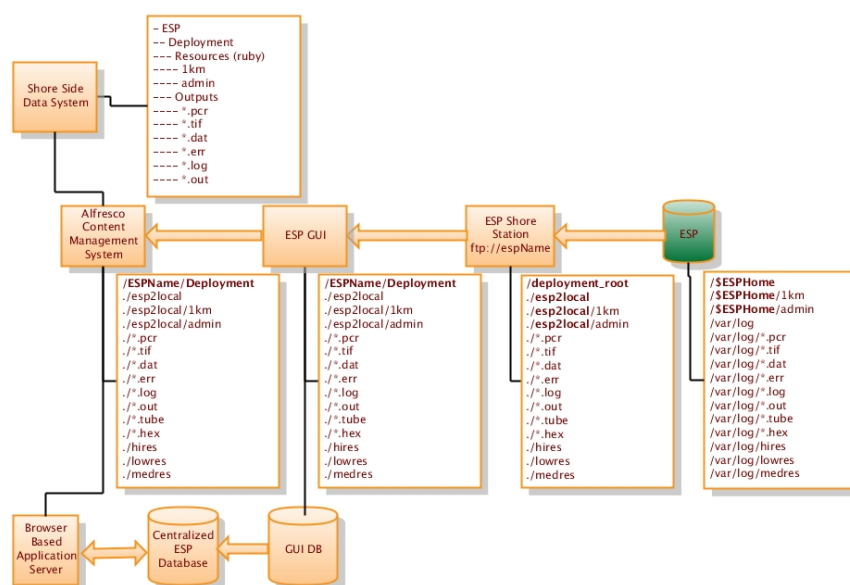
This page last changed on Aug 13, 2010 by [kgomes](#).

As a first step in designing the application to act as the Graphical User Interface (GUI) for the ESP instrument(s), a diagram was created to capture the existing structure of the digital information that will need to be tracked for each ESP instrument and the various places it will live. The ESP directory structures contains the following:

1. /var/log on the linux host is the root directory for the FTP site (i.e. = <ftp://espName>).
2. /var/log/messages contains linux kernel messages
3. /var/log/vsftpd.log records all FTP site traffic
4. /var/log/\$USER is top level output directory for each user's ESP data (can be overridden with \$ESPlog variable, but this is rare)
5. Content in /var/log depends on configuration, but default is:
 - a. hires: high resolution camera images (each approx 3.5 MB)
 - b. lores: low resolution camera images
 - c. midres: medium resolution camera images (typically autoexposures)
 - d. Top level directory contains default resolution camera images (typically fixed exposures)
6. Only files in top level directory are uploaded to shore
7. File types are:
 - a. *.tif = TIFF camera images
 - b. *.pcr = Comma Separated Value PCR Data
 - c. *.out = Console output capture
 - i. Text normally output to the esp interactive console
 - ii. Redirected here when running non-interactive mission script
 - iii. Can be viewed with showlog command
 - iv. File is named after operating mode (real, sim, simreal, quick)
 - d. *.log = detailed, binary esp engineering logs. The file is named after operating mode (real, sim, simreal, quick). Can be viewed with dumplog.
 - e. *.tube = list of carousel tubes processed
 - i. One tube per line, last line is the currently active source tube
 - f. ISUS*.err = ISUS error messages (direct from the ISUS)
 - g. ISUS*.dat = text records of the ISUS data (complex and incorporates CTD data)
 - h. CTD*.hex = CTD data in hexadecimal formatted text records
 - i. Seabird specific format

NOTE: Brent wrote up some instructions on parsing the log file [here](#)

The initial thought about how a complete data management system might look is:



Things to note

1. The ESP instrument creates and appends content to some directory on the main CPU.
2. An FTP server makes that content available to the outside world.
3. The shore station takes the FTP content from the deployed ESP and creates a mirror of the content on the shore station (this includes the ruby scripts used to run the ESP).
4. On the shore station, it can be managing content from more than one ESP and by a manual convention, old deployments are named YYYYMM.espname.
5. The .log files are files that have to be read in by a Ruby application as they are serialized Ruby objects and so need Ruby to interpret them
6. The ESP process is basically started with a 'nohup' command and any console messages are then routed to the .out file.
7. The link is not always strong over the Freewave so communication can sometimes be very slow.
8. If a command GUI wishes to send commands directly to the ruby interpreter running on the ESP itself, a slow link would cause major issues.
9. The data is then manually copied to the \\tornado\esp directory under a different layout than that of the shore station. The list below shows the directory structure on tornado which means that the 'esp' directory on tornado may actually be the YYYYMM.espname directory on the shore station.
 - a. YYYYMM
 - i. espname
 - i. esp
10. The 'messages' file is simply a symbolic link to the /var/messages so that the FTP mirror will pick them up for debugging.

So, in order to manage the data through some application, it is good to realize that the data will mostly have three locations through time:

1. The ESP instrument itself. This data is created during the deployment, is transmitted back to shore but is NOT kept permanently on the ESP instrument itself.
2. The shore station. This is an FTP synch of the data on the ESP itself and, assuming connectivity is there, will be a duplicate copy of what is deployed on the ESP itself. This will outlive the data stored on the instrument itself, but it's parent directory may be renamed when a new deployment comes up.
3. 'Permanent' storage location. This is a copy of the data that will be stored somewhere that will be a final resting place for all intents and purposes. There is a directory structure that will be adhered to and should provide a common location for all the data from the ESPs. This is sort of a post-deployment activity and should not be relied upon for storage during the deployment.

So, in order to manage this synchronization and storage of data, it was decided that the GUI would be responsible for that synchronization. Initially it would be a manual process as it will be time consuming and the user should be responsible for firing it off. Then, once it is solidified a bit, it would be nice to push it back to a background thread that happens automatically. The GUI for this synchronization, might look something like this:

Data Import for Deployment GEN2_DEP2						
Name	Size	Last Modified	Local Copy	WebDAV Copy	SSDS Registration	
CTD-ctd.hex	71KB	5/23/08 6:00:00 AM				
da08may1504h100ml.tif	708KB	5/15/08 4:04:00 PM				
da08may2315h1000ml.tif	708KB	5/23/08 10:13:55 AM				
quick.log	100KB	5/22/08 5:16:34 PM				
real.log	10153KB	5/22/08 5:19:05 PM				
real.out	3060KB	5/23/08 12:23:00 PM				

Service	Location	Connection Status
FTP	ftp://espshore.shore.mbari.org	
Local	/Users/kgomes/Documents/ESP/data/MACK/GEN2_DEP2	
WebDAV	https://alfresco.mbari.org/webdav/Projects/ESP/data/MACK/GEN2_DEP2	
SSDS	http://new-ssds.mbari.org	

[edit this mockup](#)

Next, the design group sat down to create a model that would allow the application to capture all the concepts that need to be managed in the GUI application. That data model is available at the link below.

1. [Data Model](#)

Once this model was developed to capture the concepts that will need to be stored persistently, we went to work on some mockups of what the GUI might look like. From an end user's point of view, the application will basically serve two needs: Operation of the instrument(s) and analysis of the data from the instrument(s). To meet the requirements, various GUI components will be needed (terms are from data model):

1. Create Instrument
2. Edit Instrument
3. Delete Instrument
4. Create ProtocolType
5. Edit ProtocolType
6. Delete ProtocolType
7. Create PhaseType
8. Edit PhaseType
9. Delete PhaseType
10. Add ProtocolTypes to PhaseTypes
11. Remove ProtocolTypes from PhaseTypes
12. Create ConsumableType
13. Edit ConsumableType
14. Delete ConsumableType
15. Create/Add a ConsumableAmount by creating a connection between ProtocolType and ConsumableType using an amount to characterize the link.
16. Edit the ConsumableAmount link
17. Delete a ConsumableAmount from a ProtocolType
18. Create EventType (Default events should be DEPLOYMENT, PHASE, PROTOCOL_RUN)
19. Edit EventType
20. Delete EventType
21. Create Deployment for Instrument
22. Edit Deployment
23. Delete Deployment (This will cascade delete events attached to it)
24. Create Bag
25. Edit Bag
26. Delete Bag
27. Add Bag to Deployment (for reagents, waste and power)
28. Create and Add a Phase (instance of PhaseType) to Deployment
29. Edit Phase
30. Delete Phase (and all child events)

31. Create Resource (HTTP accessible content)
32. Attach Resource to Deployment or Phase
33. Delete Resource (not the Resource itself, just the information about it).
34. Create an Image (HTTP accessible image)
35. Attach Image to Deployment or Phase
36. Delete Image (not the actual image, just the information about it).
37. View the Tide web service and add the specific location to the list of interesting locations
38. Remove tide location
39. Create new Comment
40. Attach comment to any event, image, or resource
41. Delete comment

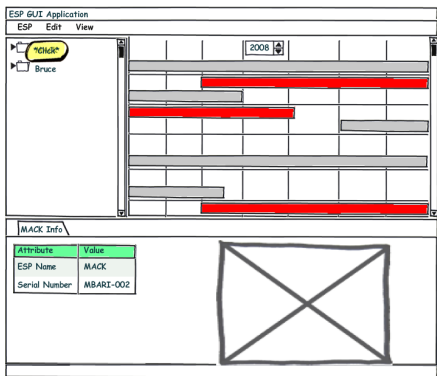
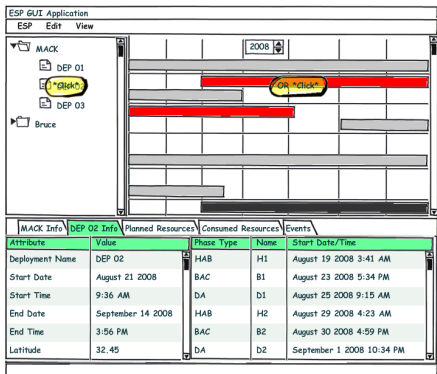
Log file interface

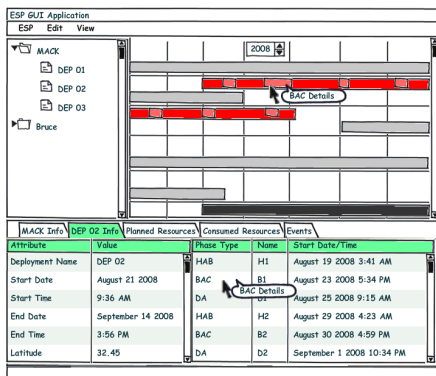
In order to get this information from the ESP system, the GUI needs and interface to the ESP which ended up being the log file. The documentation for that interface can be found at [ESP Log Interface](#)

Mockups

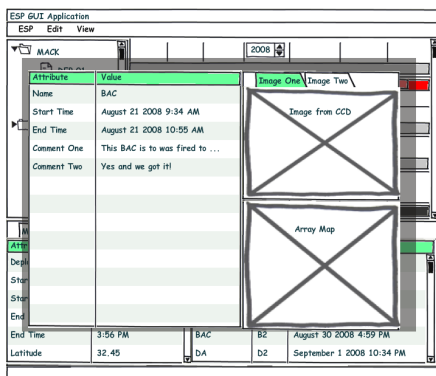
Now, if we think about sitting down at the GUI and starting it up, I would think the first view we would want is sort of an operational view of things. The things I would like to see are:

1. ESPs available
2. Overall calendar showing all planned deployments and logged events for past and current deployments. (should be able to flip this on/off quickly when I want to dive into one instrument).

Mockup	Notes
edit this mockup  edit this mockup	A mockup of what the user might see upon first starting the application. Logically, the next step would be for the user to explore the information presented: 1. Information about each ESP a. Serial Number b. Picture? Here is the mockup showing what might happen if the user selected one of the instruments.
 edit this mockup	After learning about the instrument, I might want to know more about the deployments (past, present and future). The user could then select a deployment from a list or on the calendar and find the following information: 1. Name, geospatial location 2. List of scheduled phases with start times



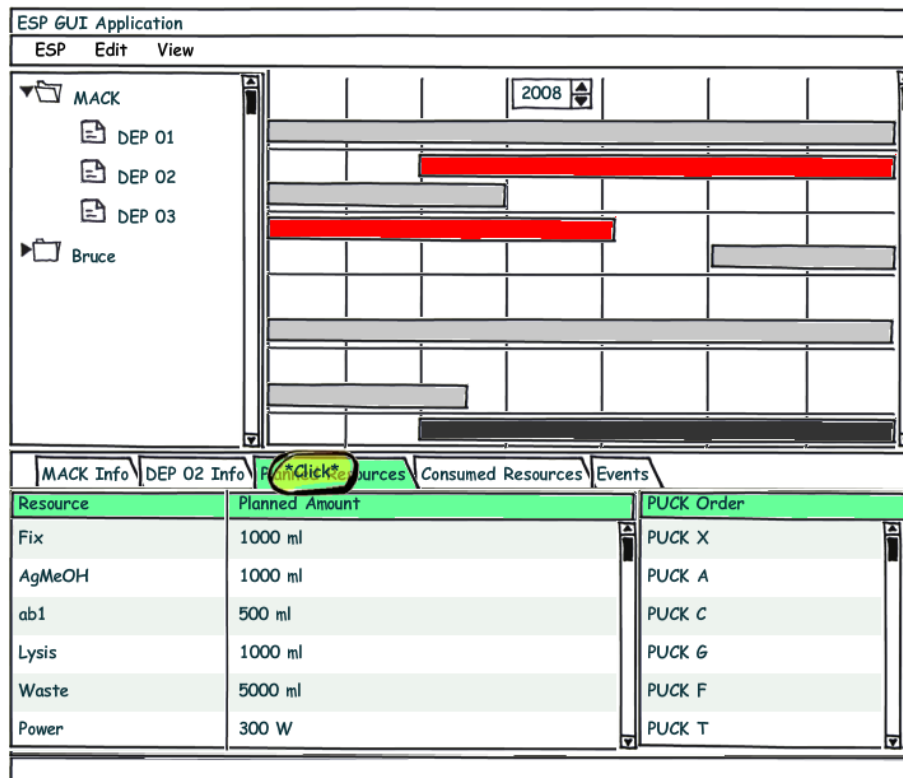
[edit this mockup](#)



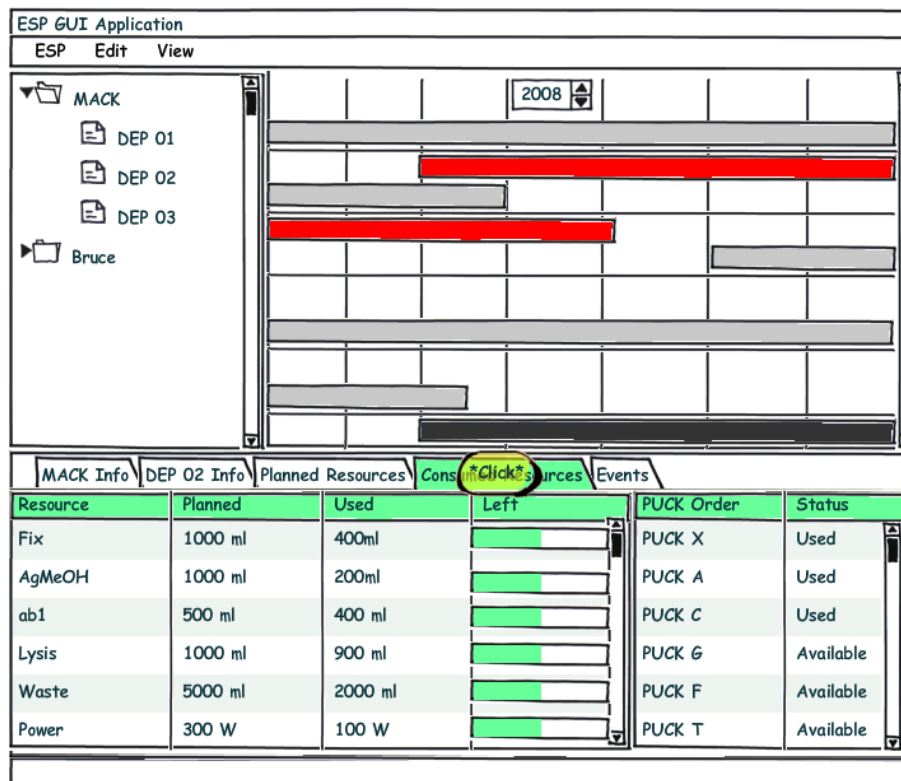
[edit this mockup](#)

In this view, the individual events (including phases) would show up on the calendar and the user could then mouse over events to get more details. These events would include comments, logged events, etc. If the user then clicks on an event in either the calendar or in the list of scheduled phases, a dialog box with more details would open.

There will also be a tab to let the user see a table list of all events for the selected deployment (both scheduled and actual). The same dialog box will show if the events are double clicked in the event list.



[edit this mockup](#)



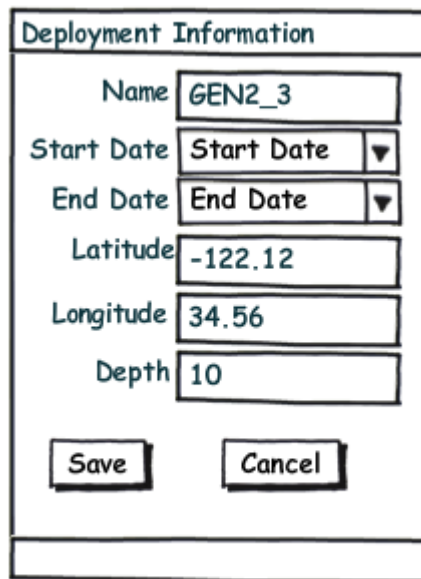
[edit this mockup](#)

Instrument Dialog Box

Instrument Information	
Name	MACK
Serial Number	1
Color	Color Chooser ▼
Shore Station	
Hostname	esp2.shore.mbari.org
IP Address	134 89 10 112
FTP Username	anonymous
FTP Password	*****
Deployed Instrument	
Hostname	mack.shore.mbari.org
IP Address	134 89 10 113
FTP Username	anonymous
FTP Password	*****
Save Cancel	

[edit this mockup](#)

Deployment Dialog

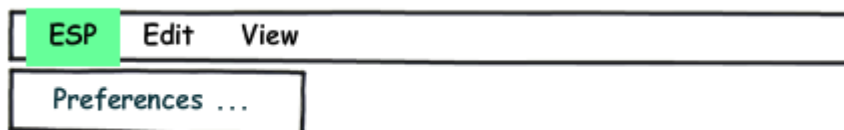


A dialog box titled "Deployment Information" with a white background and a black border. It contains several input fields: "Name" with the text "GEN2_3", "Start Date" and "End Date" with dropdown arrows, "Latitude" with the value "-122.12", "Longitude" with the value "34.56", and "Depth" with the value "10". At the bottom are "Save" and "Cancel" buttons.

Deployment Information	
Name	GEN2_3
Start Date	Start Date ▼
End Date	End Date ▼
Latitude	-122.12
Longitude	34.56
Depth	10
Save Cancel	

[edit this mockup](#)

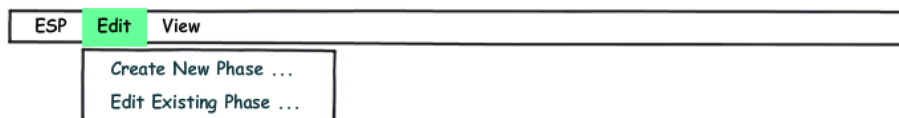
Menus



A menu bar with a white background and a black border. It contains four items: "ESP" (highlighted in green), "Edit", "View", and "Preferences ...".

ESP	Edit	View	Preferences ...
-----	------	------	-----------------

[edit this mockup](#)



A menu bar with a white background and a black border. It contains three items: "ESP", "Edit" (highlighted in green), and "View". A dropdown menu is open below the "Edit" item, showing two options: "Create New Phase ..." and "Edit Existing Phase ...".

ESP	Edit	View
Create New Phase ... Edit Existing Phase ...		

[edit this mockup](#)

Define/Edit Phases and Protocol Templates

Phase Type Information	
Name	HAB
Delay to First Protocol	10
Maximum Duration	130
Default Script	HAB @VOL_TEXT@
Display in Pick List?	☒ Checkbox
Default Color	<input type="color" value="#0000FF"/> Choose
Protocol List	
New ... Copy ... Edit ... Remove Up Down	SH1 QC SH2
Save Cancel	

[edit this mockup](#)

Protocol Type Definition

Name

SH1

Duration (minutes)

120

Delay to Sample (seconds)

60

Default Sample Volume (ml)

1000

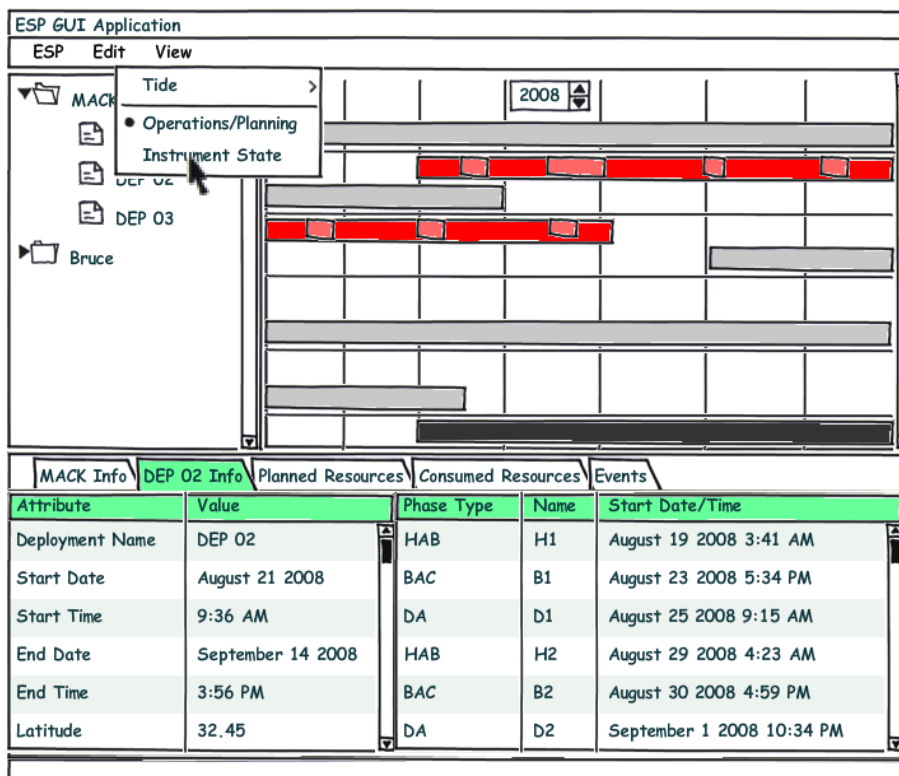
Save

Cancel

[edit this mockup](#)

Instrument State Visualization

To examine the state of the instrument for various deployments, the user would then select View->Instrument State from the pull down menu. This would put the user into a new view that shows the instrument state for the selected deployment. At the bottom is a timeline slider the user can control to change what point in time the state is to be visualized. There are also play controls to let the user control a playback of instrument states from the past

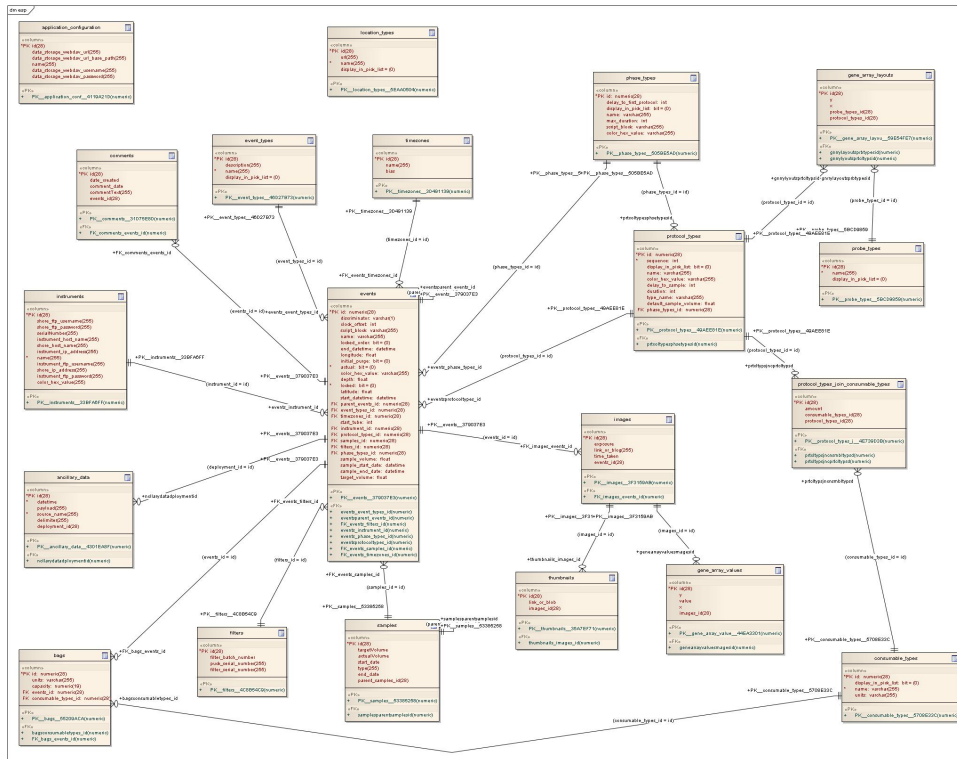


[edit this mockup](#)

Data Model

This page last changed on Feb 04, 2010 by [kgomes](#).

This page details out the data model that exists in the database to back the object model.



Notes

- I've written a basic CRUD test so I know that it can insert and delete trees of objects. Beyond that we'll have to work things out.
- At this point there is NO business logic implemented. If a transaction breaks some database rule, for example, trying to insert a ConsumableAmount without a ConsumableType, an Exception will be thrown.
- Collections are lazy loaded but I haven't written any unit tests to verify that they're working.
- I had some issues with the ConsumableAmount table. It's a many-to-many join table with an extra column for storing a value. JPA **hates** that. (You have to have the primary keys for both the ConsumableType and PhaseType **BEFORE** inserting the ConsumableAmount; so ConsumableAmount would've need to be handled in separate transactions.) The workaround was to add an id column; it's not pretty but it works.
- All testing has been done against FOG. Is this copacetic or should I start setting up MySQL for developing against?
- All transactions are currently handled through a single EAO object.
- The ESP-DAL (<- Data Access Layer) build uses Maven 2. A dependency graph is available at [here](#)

ESP Log Interface

This page last changed on May 13, 2009 by [kgomes](#).

In order to read in data from the ESP, the GUI will use the ESP's log (**real.log**) file as the official 'interface' for data collection. In order to facilitate this, this page documents what the entries in the log file should look like so that the ESP GUI will not have to make extensive and fragile rules to try and interpret the data. The esp gui log data should have the following format in the context the [raw log file](#):

EVENT-NAME,attribute=value,...

Notes:

1. Time is designated using epoch seconds (number of seconds that have elapsed since January 1, 1970) in *GMT*
2. EVENT_NAME is one of the following:
 - a. BEGIN_MISSION
 - b. PHASE_START
 - c. PHASE_END
 - d. PROTOCOL_START
 - e. PROTOCOL_END
 - f. SAMPLE_START
 - g. SAMPLE_END
 - h. CAMERA_SNAP
 - i. END_MISSION
3. Attributes are key=value pairs and vary from event to event. Attributes for the various events are:
 - a. BEGIN_MISSION
 - i. No attributes
 - ii. Example: BEGIN_MISSION
 - b. PHASE_START
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. Example: PHASE_START, phase_name=hab
 - c. PHASE_END
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=EPOCH_SECONDS (this is the time that the phase started. This is necessary due to the fact there are multiple threads the name & start date are the unique key.)
 - iii. Example: PHASE_END, phase_name=hab, phase_start=1231372399
 - d. PROTOCOL_START
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=EPOCH_SECONDS
 - iii. protocol_name=PPPPP (e.g. sh1, sh2, wcr)
 - iv. Example:
PROTOCOL_START, phase_name=hab, phase_start=1231372399, protocol_name=sh1
 - e. PROTOCOL_END
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=EPOCH_SECONDS
 - iii. protocol_name=PPPPP (e.g. sh1, sh2, wcr)
 - iv. protocol_start=EPOCH_SECONDS
 - v. Example:
PROTOCOL_END, phase_name=hab, phase_start=1231372399, protocol_name=sh1, protocol_start=1231372399
 - f. SAMPLE_START
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=YYYY-MM-DDThh:mm:ssZ
 - iii. protocol_name=PPPPP (e.g. sh1, sh2, wcr)
 - iv. protocol_start=EPOCH_SECONDS
 - v. target_volume=ZZZZml
 - vi. Example:
SAMPLE_START, phase_name=hab, phase_start=1231372399, protocol_name=sh1, protocol_start=1231372399, target_volume=1000ml
 - g. SAMPLE_END
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=EPOCH_SECONDS
 - iii. protocol_name=PPPPP (e.g. sh1, sh2, wcr)
 - iv. protocol_start=EPOCH_SECONDS
 - v. sample_volume=ZZZZml

- vi. Example:
SAMPLE_END, phase_name=hab, phase_start=1231372399, protocol_name=sh1, protocol_start=1231372399
- h. CAMERA_SNAP
 - i. phase_name=XXXXXX (e.g. hab, larv, da, habda)
 - ii. phase_start=EPOCH_SECONDS
 - iii. file_name=ZZZZZZZZZ.tif
 - iv. auto_exposure=AAAAAAAs
 - v. Example:
CAMERA_SNAP, phase_name=hab, phase_start=1231372399, file_name=bac08oct1716h450m140s.tif, auto_exposure=AAAAAAAs

Actual log entries

Rich made the changes to the ruby code to generate the log entries in the following format:

- i. protocol/BAC.rb
 - i. Thread.log.data "BAC_BACSH1_START"
 - ii. Thread.log.data "BAC_BACSH1_END"
 - iii. Thread.log.data "BAC_SHORTBACSH2_START"
 - iv. Thread.log.data "BAC_SHORTBACSH2_END"
 - v. Thread.log.data "BAC_PHASE_START"
 - vi. Thread.log.data "BAC_PHASE_END"
- ii. protocol/samplepass.rb
 - i. Thread.log.data "SAMPLEPASS_LYFIL_START"
 - ii. Thread.log.data "SAMPLEPASS_LYFIL_END"
- iii. protocol/PUFM.rb
 - i. Thread.log.data "PUFM_START"
 - ii. Thread.log.data "PUFM_END"
 - iii. Thread.log.data "PUFM_WITHINITIALPURGE_START"
 - iv. Thread.log.data "PUFM_WITHINITIALPURGE_END"
- iv. protocol/HAB.rb
 - i. Thread.log.data "HAB_HABSH1_START"
 - ii. Thread.log.data "HAB_HABSH1_END"
 - iii. Thread.log.data "HAB_SHORTHABSH2_START"
 - iv. Thread.log.data "HAB_SHORTHABSH2_END"
 - v. Thread.log.data "HAB_PHASE_START"
 - vi. Thread.log.data "HAB_PHASE_END"
- v. protocol/wcr.rb
 - i. Thread.log.data "WCR_PROTOCOL_START," + " volume=#{sampleVolume}"
 - ii. Thread.log.data "WCR_PROTOCOL_END"
- vi. protocol/DA.rb
 - i. Thread.log.data "DA_DAEXTRACT_START"
 - ii. Thread.log.data "DA_DAEXTRACT_END"
 - iii. Thread.log.data "DA_START"
 - iv. Thread.log.data "DA_END"
 - v. Thread.log.data "DA_SHORTDA_START"
 - vi. Thread.log.data "DA_SHORTDA_END"
 - vii. Thread.log.data "DA_HAB4DA_START"
 - viii. Thread.log.data "DA_HAB4DA_END"
 - ix. Thread.log.data "DA_HABDA_START"
 - x. Thread.log.data "DA_HABDA_END"
- vii. protocol/utilities.rb
 - i. Thread.log.data "PROTOCOLARGS, assay=#{opts[:assay]}, maxvolume=#{sampleVolume.first}, wcrmaxvolume=#{sampleVolume.last}"
 - ii. Thread.log.data "INITIALPURGE_START"
 - iii. Thread.log.data "INITIALPURGE_END"
 - iv. Thread.log.data "FINALPURGE_START"
 - v. Thread.log.data "FINALPURGE_END"
- viii. protocol/LARV.rb
 - i. Thread.log.data "LARV_LARVSH1_START"
 - ii. Thread.log.data "LARV_LARVSH1_END"
 - iii. Thread.log.data "LARV_SHORTLARVSH2_START"
 - iv. Thread.log.data "LARV_SHORTLARVSH2_END"
 - v. Thread.log.data "LARV_PHASE_START"

- vi. Thread.log.data "LARV_PHASE_END"
- vii. Thread.log.data "LARV_PHASE_WITHPURGE_START"
- viii. Thread.log.data "LARV_PHASE_WITHPURGE_END"
- ix. protocol/sh2.rb
 - i. Thread.log.data "SH2_PROTOCOL_START"
 - ii. Thread.log.data "SH2_PROTOCOL_END"
 - iii. Thread.log.data "SH2_SHORTSH2_START"
 - iv. Thread.log.data "SH2_SHORTSH2_END"
 - v. Thread.log.data "SH2_SH2CORE_START, phase=#{phase},label=#{label}"
 - vi. Thread.log.data "SH2_SH2CORE_END"
- x. protocol/sh1.rb
 - i. Thread.log.data "SH1_PROTOCOL_START"
 - ii. Thread.log.data "SH1_PROTOCOL_END"
 - iii. Thread.log.data "SH1_COLLECTSAMPLE, " + "volume=#{sampleVolume},
bubblepoint=#{collectionSampler.bubblePt}"
 - iv. Thread.log.data "SH1_COLLECTSAMPLE_COMPLETE"
 - v. Thread.log.data "SH1_LYSING,
volume=#{lysisVolume},solution=#{lysisSolution}"
- xi. protocol/MFB.rb
 - i. Thread.log.data "MFB_MFBSh1_START"
 - ii. Thread.log.data "MFB_MFBSh1_END"
 - iii. Thread.log.data "MFB_START"
 - iv. Thread.log.data "MFB_END"
- xii. protocol/KAR.rb
 - i. Thread.log.data "KAR_KARSH1_START"
 - ii. Thread.log.data "KAR_KARSH1_START"
 - iii. Thread.log.data "KAR_SHORTKARSH2_START"
 - iv. Thread.log.data "KAR_SHORTKARSH2_END"
 - v. Thread.log.data "KAR_PHASE_START"
 - vi. Thread.log.data "KAR_PHASE_END"
- xiii. lib/esp.rb
 - i. Thread.log.data "LIB_ESP_IRB_START, string=" + \$0
 - ii. Thread.log.data "LIB_ESP_CONFIG,instrumentname=#{Name},
cfgpath=#{ConfigPath}"
 - iii. Thread.log.data "LIB_ESP_IRB_END"
 - iv. Thread.log.data "LIB_ESP_APPLICATION_START, string=" + \$0
 - v. Thread.log.data "LIB_ESP_CONFIG, instrumentname=#{Name},
cfgpath=#{ConfigPath}"
 - vi. Thread.log.data "LIB_ESP_APPLICATION_END"
- xiv. lib/cmdserver.rb
 - i. Thread.log.data "LIB_CMDSERVER_ABORTMISSION" + reason
 - ii. Thread.log.data "CAMERA_SNAP, " + "string=#{instance}: #{SNAP} #{args}"
 - iii. Thread.log.data "CAMERA_OUTPUT_" + myn.to_s + ", string= " + line



above should expand to:

```
CAMERA_OUTPUT_1, string=Starlight Xpress HX9/16: 1392x1040
pixel 16-bit CCD camera
CAMERA_OUTPUT_2, string=Exposing 348x260 pixel 16-bit image
for 25.668 seconds
CAMERA_OUTPUT_3, string=/var/log/rich/
larv07oct3015h50ml2.5s.tif: TIFF Upload Complete
```

- xv. utils/puckmoves.rb
 - i. Thread.log.data "PUCKMOVES_LOADCLAMP, " +



above expand to:

```
PUCKMOVES_UNLOADCLAMP, source= , pucknumber= , tube= , clamp=
```

- ii. Thread.log.data "PUCKMOVES_LOADCLAMP_EMPTYTUBE, tube=#{tube}"
- iii. Thread.log.data "PUCKMOVES_UNLOADCLAMP, " + guiMsg % [source.label,
clamp.name, toTube]



above expand to:

```
PUCKMOVES_UNLOADCLAMP, source= , clamp= , tube=
```

```
xvi.  utils/misc.rb
      i.  Thread.log.data "MISC_STORAGE_SELECTTUBE_TO"
      ii. Thread.log.data "MISC_STORAGE_SELECTTUBE"
      iii. Thread.log.data "MISC_STORAGE_SRCTUBE, tube=" + startingTube.to_s
      iv. Thread.log.data "MISC_SRCTUBE"
      v.  Thread.log.data "MISC_DSTTUBE"
xvii. utils/sampler.rb
      i.  Thread.log.data "SAMPLER_SAMPLED, " + "volume=%.1f" % sampledVol
xviii. mission/08sep.rb
       i.  Thread.log.data "MISSION_START, esp=#{ESP::Name},
          mission=#{ESP::Mission}, starttube=#{startTube}, fromtube=#{fromTube}"
       ii. Thread.log.data "MISSION_END, esp=#{ESP::Name},
          mission=#{ESP::Mission}"
```



Above was changed

Essentially the message are the same, but Brent pulled the method calls into a :protocol method defined in utils.rb so the individual protocols don't have to do anything specific.

Comments

See the new page I just added about parsing these entries on the context of the raw log file.

These entries may be defined any way you like

I don't see how "phases" can have names. A phase is a sequence of protocols.

Generally, the ESP sleeps between phases.

I like the key=value format, but please try to shorten the key names a bit. This log file is too big as it is.

I kind of like the idea of units suffixes, if you really intend to parse them. But, if you are just going to ignore them,

I'd rather omit them entirely. That means, the data manager has to know that 1L == 1000ml

Are you up for that?

Posted by [brent](#) at Jan 07, 2009.

Parsing the Raw ESP Log File Format

This page last changed on Oct 12, 2011 by [kgomes](#).

This page is intended to provide just enough information about the ESP's raw file format so that the ESP GUI can parse it to extract time and data management entries. More complete documentation is available in MBARI's CVS repository in the file: `ESP/gen2/software/esp/lib/log.rb`.

The raw, real-time log is typically named **real.log**. The actual log file name is determined by the mode of ESP operation that generated it. A quick simulation log of a mission would be written to **quick.log**, for example. A real-time simulation would be written to **simreal.log**.

All raw log files consist of a series of log entries, each of which is separated by a single ASCII linefeed (0x0a) character. Each log entry line begins with a byte that denotes its type. This simple record structure allows one to easily skip over types of log entries they do not recognize. The types of log entries that the GUI will probably want to process are *timestamp*, *time_mark*, *time_increment*, *alias_definition* and *gui_data* records. These log entries conform to the following grammar:

Non-terminals: (terminal symbols enclosed in <>)

digit = <0>..**<9>**

capital = <A>..**<Z>**

alpha = capital | <a>..**<z>**

timezone = capital[capital]?[capital]? #Ex. GMT, PST, PDT, Z

moniker = alpha|digit

character = <any byte except <">, <\>, <linefeed>> | <\><"> | <\><\> | <\><linefeed>

string = [character]+

actor = <">string<">|moniker|<\>

Log entries:

time_mark = <@>digit*[<.>digit+]?timezone #Ex. 3.14PST, .1PST, 999.01GMT, 1232498793.34PST

timestamp = <@>timezone?digit*[<.>digit+]?[</>digit*[<.>digit+]?]? #Ex. 3.14, .1, 999.01, PST1232498793.34/100.0

time_increment = <+>digit* #Ex. 3, 0, 100

alias = <=>moniker?[">string<">]? #Ex. =tMAIN, =hcore, =ECan

gui_data = <\>actor?string #not context free, see notes below

Grammar Notes:

The actor non-terminal token in the `gui_data` production may be omitted if the first character of the following string is not equal to any moniker defined in a previous `alias_definition`. Otherwise, the placeholder actor `<\>` must be inserted before the string.

An alias without a "string" deletes the alias associated with the indicated moniker

A alias missing moniker (and "string") deletes all aliases.

time_increment with no digits `<+>` is equivalent to +1 tic.

Example raw gui_data log entries:

`arbitrary text

"thread_name"arbitrary text #switched to thread_name

\Sam is cool #There is an actor whose moniker is 'S', so it must be escaped

\Saturday symphony \
on the lawn \
in the park. #multiline text

Tracking Log Time:

timestamps: Set the current log time.

- If the timezone is specified, system is operating in real-time.
- Real log time is Epoch seconds from Midnight 1/1/70 GMT.
- If the timezone is omitted, system is operating in simulated time
- Simulated log time is simply (simulated) seconds from simulation start.
- Assume 100 Tics Per Second if tics per second is omitted

time_increments: Increment the current real or simulated log time by specified number of tics.

time_marks: Indicate the Real-time at which the entry was generated.

- The timezone is always specified.
- Does not alter the current log time.

Each log entry has a "context" that consists of its log time and the actor that wrote it.

Initialize log entry context upon raw log file open:

```
logTime = 0
timeZone=:simulated
actors = {} #empty hash
actor = ""
ticsPerSecond = 100 #default tics per second
```

GetNextGuiDataText:

```
loop do
  case (entry type)
    when timestamp:
      logTime = epoch seconds specified
      if (zone specified)
        timeZone=zone from timestamp
      if (ticsPerSecond specified)
        ticsPerSecond = ticsPerSecond from timestamp
      continue;
    when time_increment:
      if increment specified
        logTime += specified increment / ticsPerSecond
      else
        logTime += 1 / ticsPerSecond
      round logTime to the nearest tic
      continue;
```

```

when alias:
    if (moniker present)
        if (string present)
            actors[moniker] = string
        else
            actors.delete moniker
    else
        actors.clear #delete all monikers from hash
    continue;
when gui_data:
    c = character following <`>
    if (c == <"> )
        actor = text between quotes
    else if (c == <\>)
        return next character to end of entry
    else if moniker[c] exists
        actor = moniker[c]
        return next character to end of entry
    else
        return c + next character to end of entry
end #case
end #loop

```

Parsing Rules

Given the above information, here are the rules that will be applied to parsing a raw log file (.log):

Event	Example	Rule Used	Information Parsed
Mission Start	. "Qmail"GoodNews.email "Starting w/pucks in tube 3\\n Ending Wed Oct 28 08:00:00 PDT 2009", :Subject=>"09sep29mop begun"	^GoodNews\\.\\S+\\s+\\ \\\"Starting\\s+w/pucks \\s+in\\s+tube\\s+(\\d +).*Subject=>\\\"(\\S \\s+begin\\\".*	1. Starting tube 2. Mission name
Ancillary Data	#\Can@13:19:34, 48.2V, 17.3C, 44% humidity, 14.5psia, 14.84V, 0.42A, 0.413A avg, 6.21W CTD@13:24:25, 3.3694C, 999.623 decibars, 3.1914 S/m, 104.61%,	1. First it removes all newlines from the log entry and then checks to see if the entry may have ancillary data by using the pattern	1. Source 2. Time 3. Payload

	-0.180 1/m, 0.33 ml/l, 3.0760C ISUS@13:24:45, 24.460 uM/L no^3, -1.000 uM/L hs, 22.7800psu	^Can@.* 2. If it matches, then it takes the original log entry, splits it by newlines (I replace '\' with newlines earlier in the process) and then pattern match each line with ^(\\S+)@(\\d\\d): (\\d\\d):(\\d\\ \\d),(.*)\$ to search for time, source and the payload of the message.	
Process Run Start with Archive	#pcr sampling at most 1000ml, wcr at most 1000ml	^(.+ sampling at most (\\d+\\..*\\d*)ml, wcr at most (\\d+\\..*\\d*)ml	1. Process run name 2. Process Run Target Volume 3. Archive Target Volume
Process Run Start without Archive	#bac wcr sampling at most 1000ml	^(.+ sampling at most (\\d+\\..*\\d*)ml	1. Process run name 2. Process Run Target Volume
Start Sample	#t\\Sampling 100.0ml	^Sampling\\s+(\\d+\\..*\\d*)ml.*\$	Target Volume
Stop Sample	#t\\Sampled 100.0ml	^Sampled\\s+(\\d+\\..*\\d*)ml.*\$	Actual Volume
DWSM Start Sample	#t\\Sample Bag inhaling 5000.0ml	^Sample Bag inhaling\\s+(\\d+\\..*\\d*)ml.*\$	Target Volume
DWSM Stop Sample	#tWaiting up to 90s for Sample Bag to stabilize at 2279.4psia +/-25.0	^Waiting up to (\\d+)+s for Sample Bag to stabilize.*\$	Nothing
Image Capture	#"sh2"\\Starlight Xpress HX9/16: 1392x1040 pixel 16-bit CCD camera \\Exposing 696x520 pixel 16-bit image for 40 seconds\\ /var/log/esp/ pcr11jul1500h2000ml40s.tif: TIFF Upload Complete	Uses two patterns: 1. One ^.*Exposing\\s+(\\d+)x(\\d+)\\s+pixel\\s+(\\d+)-bit\\s+image\\s+for\\s+(\\d+\\..*\\d*)\\s+seconds(.*.tif).*\$ 2. Two ^(.*)\\\/([a-zA-Z0-9]+)(\\d{2})([a-zA-Z]{3})(\\d{2})(\\d{2})h(\\	1. One a. Image file name 2. Two a. ProcessRun name b. Exposure Time

Java HMI SCADA Frameworks

This page last changed on Aug 06, 2009 by [kgomes](#).

This page documents some of the HMI/SCADA packages that are available for Java that we might use to build the instrument state GUI. Here is a table documenting the aspects of the various frameworks:

Framework	Company	Description	URL	Cost	Licensing	Notes
MISstudio	ErgoTech	An intuitive drag-and-drop tool that lets you easily build secure Manufacturing Intelligence, Factory Automation and SCADA System. Design with one tool, deploy to Windows, Linux, J2EE, OSGi and headless embedded systems. View in any browser, on your PDA, or even on your Phone - any environment that supports a Java Applet.	http://www.ergotech.com/index.html	\$2500	Web based (applets) so doesn't seem to be a licensing cost for deployment	Since it is applet, probably not going to work for us. Looks heavily focused on packaged HMI, not really a general framework so that is not great. Also did not see much in the way of support on their web site (no manuals, wikis, etc.)
GLG Toolkit	Generic Logic	GLG's extensive library of dials and meters, gauges, graphs, process control widgets and other graphical components is built on top of the Toolkit's object engine - an approach radically different from the	http://www.genlogic.com/components.html			This looks like a pretty nice option. They have a widget catalog here: http://www.genlogic.com/widgets.html and probably would cover what we would use it for.

		traditional methods of creating programming components.				
JSENT	JSENT	JSENT is a pure Java-based Supervisory, Control and Data Acquisition SCADA software product that runs on both Windows and Linux.	http://www.jsent.co.za/index.html	?		This looks like an actual application so it really doesn't fit our needs
Factory PMI	Inductive Automation	A web-launched, database driven plant management interface suite. Featuring SQLTags.	http://www.inductiveautomation.com/products/factorypmi/	\$3500	\$0	This is a turn-key solution and really doesn't fit what we need. Licensing would be OK and the delivery looks like JWS, but not sure how customizable it will be and probably cannot be integrated into our application.
JPC	Net Module	Easy to use (drag and drop) HMI development tool. Engineers without Java programming experience can build their HMIs. The product bundle 'JPC Framework' comprises the JPC Components 'JPC Client', 'JPC Server' and 'JPC	http://www.netmodule.com/en/products/netmodule_jpc/	?	?	Looks like a large package really tailored to connect up with factory floor systems and provides a tool for drag-n-drop GUI building for HMI. Probably more than we want and not sure we could break out the

		Ambassador'. It is the basic product and you must acquire it when you start developing your JPC application. All other JPC Components are separate products.				component from the GUI builder.
JViews Diagrammer	IBM (was ILOG)	ILOG JViews Diagrammer is the most comprehensive set of Java tools, components and libraries for creating graphical editing, visualization, supervision and monitoring tools. Both diagrams-displays used to show the relationships between objects-and dashboards-displays for monitoring business or industrial systems-can be easily created.	http://www.ilog.com/products/jviews/diagrammer/			One of the better frameworks out there, but costs were a bit of a nightmare to manage. Maybe it is better now. I have a request in to the guy that I worked with before and now that they are IBM, maybe things have changed

Object Model

This page last changed on Apr 02, 2010 by [kgomes](#).

Here is the information for the data model that was created to back the information needed in the GUI.



Real-Time ESP state update protocol framework

This page last changed on Oct 12, 2010 by [brent](#).

This is the documentation to detail out the design of the state representation interface between the GUI application and the instrument itself. This interface will allow the GUI (and other applications) to get information about the current state of the various components of the ESP.

Some details about the interface:

1. The ESP application (server) shall listen on a fixed TCP socket.
2. Any number clients can connect to this socket, each thereby opening a separate, private, bidirectional, ASCII connection to the ESP server.
3. The server will respond to the following client commands:
 - a. List all available states
 - i. Each state is identified by a short symbolic (ASCII) name.
 - b. Retrieve metadata for subset of those states and subscribe to them
 - i. Elements in lists of states are separated with commas
 - i. There is no whitespace between list elements
 - ii. The order of the elements in state lists determine the ordering in reporting state vectors described below.
 - iii. Metadata shall include:
 - i. Description e.g. Storage carousel
 - ii. sprintf format string e.g. %.2fml
 - iii. range (min and max expected values)



hardware failures may cause reported values to be out of range

- iv. map of symbolically labeled positions, each on a line of this format:

`<numeric position>,<symbolic label>,<alias1>,<alias2>,<aliasN>`

- c. Subscribe to updates on (only) the specified states



This limits subsequent state updates to just those listed by their symbolic names. This message also determines the ordering of states in vectors described below.

- d. Refresh all subscribed states



All the subscribed states are sent to the client in the order in which they were listed in the most recent subscribe or retrieve metadata message.

```
<timestamp? seconds since epoch??>
<new value[0]>{,optional additional info like current, pwm%, etc. (may be ignored)}
<new value[1]>{,optional additional info like current, pwm%, etc.}
...
<new value[n-1]>{,optional additional info like current, pwm%, etc.}
```

where n is the number of states subscribed. This establishes a baseline from which subsequent state changes are reported.

- e. Request C more changed state updates at maximum rate one per t tenths of seconds.



- The client tells the server it is ready to receive C more state change responses and that the server may emit these at a rate no faster than one every t tenths of a second.
- A client wishing to continuously monitor state should send a new request shortly **before** the last update (as allowed by the previous request) has been received. If C is kept small (say 10 or so), this mechanism will ensure that update messages don't back up on the networking queue, while avoiding paying any network latency penalty. (Similar to TCP's sliding window mechanism)
- The client can stop updates by requesting 0 more at some arbitrary rate.

- Only those states whose values changed since the last update will be sent
- Format will be a list of lines, each of the form:

```
<index>,<new value>{,optional additional info like current, pwm%, etc.}
```

where:

- index = an integer from 0 to n-1 where n is the number of subscribed states
- new value = number conforming to the state's sprintf format string (note that the unit suffix will be omitted, i.e. 0.2 not 0.2ml)



Notes for Brent

Normally, all I2C messages between the Linux host and the dwarves are logged. However, this protocol will require continuous polling of all the subscribed dwarves' raw positions. Nothing else currently does anything like this (by design!



. Clearly, such messages should not be logged. Further, it may be necessary to add an I2C message to the dwarf firmware that queries raw position only. The existing full status poll message returns lots of extraneous engineering info like velocity, electrical current, etc.

Comments

2-Feb-2011(weekly gui meeting). There will be a keep-alive message at some interval for the case where nothing is changing in the subscribed-to states - so the dashboard can know when coms are lost with the esp. Also, still need to resolve the 'raw units' vs. 'engineering units' question. Dashboard will need to get to engineering units somehow. Brent still wants to think this thru a bit more.

3-Feb-2011 Roman pointed out that we also need to know at the dashboard when the the esp is locked up with an error. Rich discussed briefly with Brent. While it may not strictly be 'state', it is important info to communicate to users via the dashboard. Brent suggested perhaps a second socket would have the error messages (question... how would we notify the dashboard when error condition had cleared?).

Posted by [rich](#) at Feb 03, 2011.

Wanted to capture here from earlier GUI meeting discussions: ESP on-board will track and provide additional state items for things like number of pucks in a tube, capacity and current volume estimate for reagent & waste bags etc. These items can only really be inferred by the ESP as it is initialized and run as there is no actually sensor measuring these 'states'.

Posted by [rich](#) at Feb 03, 2011.

Security Mechanism

This page last changed on Sep 16, 2010 by [kgomes](#).

For several aspects of the ESP GUI application, the application will have to have an associated user, which will, in turn, belongs to specific groups. The reason for this is that we do not want the application to allow any user to do all things in the ESP GUI. For example:

1. Maybe you want to limit users to read-only.
2. Certain users can create mission scripts for certain ESP instrument
3. Certain users can delete deployment information.
4. etc.

In order to enable this type of access control, the Java SE security infrastructure was utilized in the GUI development.

Resources:

1. [Java SE Security](#)
2. [Java SE Security Overview](#)
3. [JAAS Authentication Tutorial](#)
4. [JAAS Authorization Tutorial](#)
5. [JAAS Reference Guide](#)

Technology Notes

This page last changed on Apr 05, 2010 by [kgomes](#).

Here are some links to information that was important during the design of the GUI:

General Swing

1. [A Visual Guide to Swing Components](#)
2. [Laying Out Components Within a Container](#)
3. [How to Use Split Panes](#)
4. [Threads and Swing](#)

JGoodies Forms

1. [JGoodies Forms FAQ](#)
2. [The JGoodies Forms Framework \(PDF\)](#)
3. [JGoodies Forms Tutorial - Introduction](#)
4. [JGoodies Forms Tutorial - Basics](#)
5. [JGoodies Forms Tutorial - Quick Start](#)
6. [JGoodies Forms Tutorial - Building](#)
7. [JGoodies Forms Tutorial - Factories](#)
8. [JGoodies Forms References](#)
9. [JGoodies Forms Tips and Tricks](#)

MiGCalendar

1. [JavaBeans Guide \(PDF\)](#)
2. [Getting Started Guide \(PDF\)](#)
3. [AShape Developers Guide \(PDF\)](#)
4. [FAQ](#)
5. [MiG Calendar Tutorial \(PDF\)](#)
6. [Running the Examples \(PDF\)](#)
7. [Themes Developer's Guide \(PDF\)](#)
8. [JavaDocs](#)

Ruby/JRuby

1. [Embedding JRuby](#)
2. [Embedding JRuby - Code Examples](#)
3. [Deploying JRuby with Java Web Start](#)

XTide

1. [XTide Web Site](#)
2. [A Brief Introduction to XTide](#)

Developer Documentation

This page last changed on Dec 02, 2014 by [kgomes](#).

For the developers

1. [Opening in an IDE](#)
2. [Image Processing](#)
3. GUI Notes
 - a. [Ruby integration](#)

Image Processing

This page last changed on May 05, 2008 by [brian](#).

Overview

Notes

The printer used by [Chris Scholin](#) is a custom printer. It can not output GAL files. It does put out a text file that I'm trying to parse and work with. A copy of the file is checked into [SVN](#).

Piezzo Array Printer

The file that is used to describe the Piezzo array has lines that look like this:

SpotNum	SrcWell	SrcNum	TipNum	SubNum	SpotX	SpotY	SpotVol	Status
1	C-1	1	2	5	9380	45310	20	OK
2	A-1	1	1	5	9380	50590	20	OK
3	C-1	1	2	4	9380	74060	20	OK
4	A-1	1	1	4	9380	79340	20	OK
5	C-1	1	2	3	9380	102810	20	OK
6	A-1	1	1	3	9380	108090	20	OK

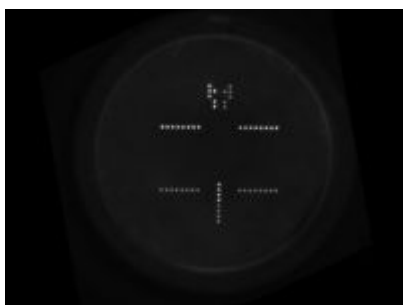
SpotX and *SpotY* are coordinates in micrometers starting in the upper left hand corner of the paper. The *0, 0* point is actually 6.5mm from the upper left hand side of the paper itself. Multiple arrays are usually printed on a single paper and then cut out.

SrcWell indicates the contents of the spots. For example, all spots from the *C-1* source well will have identical chemistries applied.

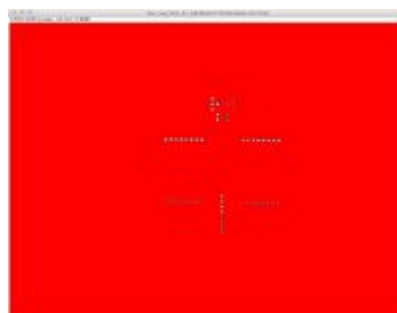
Image Analysis

Maximum Entropy thresholding does a decent job of delineating the control spots. Unfortunately, I haven't found a technique for delineating the spots that don't go off. In fact those spots can contain values within the range of the background noise.

([view as slideshow](#))



Raw ESP image



Masked Image

Possible avenues of exploration

The ESP folks would like an automated image analysis package that:

1. Reads the image
2. locates the spots (either with or without the help of the GAL-like file)
3. Read the highest 8x8 block (full size image) or 4x4 block (half-size image) average within the spot. The block average is square with no weighting applied.
4. Return a text file (Tab or comma delimited) with:
 - Average intensity associated with the *SrcWell* (i.e. C-1, A-1, etc.)
 - Standard deviation by *SrcWell*
 - Average intensity of background disk (excluding spot values)

Analysis Steps (in progress)

1. Read in *layout description file* with LayoutViewer
2. Generate a *single assay* image.
3. Select the control spots and export spot list to a new *Layout Description File*
4. Read in single control spot list
5. Read in measurement image.
 - Convert to binary image using *maximum entropy threshold* technique
6. Convert both images to polar and log-polar coordinates
7. Calculate translation and rotation of control spots using techniques described in [Robust Image Registration Using Lo-Polar Transform](#)

References

1. Old ESP Matlab toolbox at <http://moonjelly/cgi-bin/cvsweb.cgi/ESP/matlab/>

Opening in an IDE

This page last changed on Dec 23, 2008 by [kgomes](#).

Opening the ESP project in an IDEA

Eclipse

1. [Check out the esp/trunk from SVN](#)
2. cd to the directory you checked it out to
3. In a terminal run:

```
mvn eclipse:eclipse
```
4. In eclipse do *File->import*
 - Select *existing project from workspace*

IntelliJ IDEA

1. [Check out the esp/trunk from SVN](#)
2. cd to the directory you checked it out to
3. In a terminal run:

```
mvn idea:idea
```
4. Do *File->Open Project*

JBuilder

1. [Check out the esp/trunk from SVN](#)
2. In Jbuilder do *File->import*
3. Select *existing maven project from workspace*

Netbeans

1. [Check out the esp/trunk from SVN](#)
2. Install the Maven plug-in in Netbeans
 - a. Select *Tools-Plugins*
 - b. In the dialog that appears, select the *New Plugins* tab
 - c. Check the box next to **Maven**
 - d. Press the install button
3. Do *File->Open Project*
4. Select the project (Netbeans will open all the child projects too)

Ruby integration

This page last changed on Feb 05, 2010 by [kgomes](#).

Background

In order to really interact with the ESP, it was clear that some level of Ruby integration would really be best in the GUI. For this reason, I turned to JRuby in order to be able to access a Ruby engine from within the GUI. I used the information here:

<http://kenai.com/projects/jruby/pages/RedBridge>

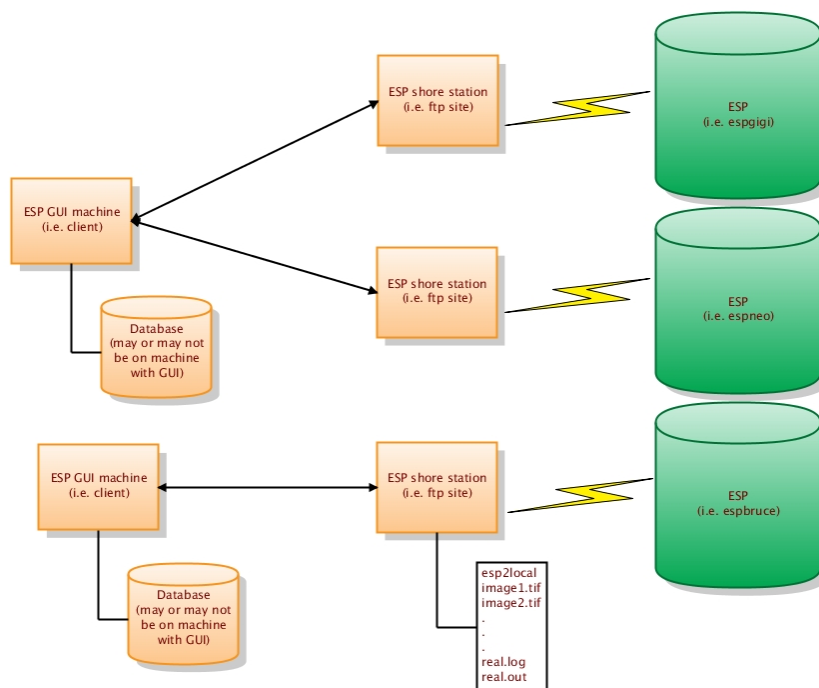
to get me going. I chose the Embed Core way of doing it as I thought it would be the best way to do what we need to do.

The Ruby environment

In order to understand much about the scripts, the Ruby interpreter uses several environment variables to figure out what context and configuration the ESP is running in. Those variables are:

1. **ESPhome** - is the top level (root) directory of the ESP source code tree.
2. **ESPname** - is the name of the ESP machine. Note this may be the hostname of the machine that it is running on, minus any "esp" that is prefix removed.
3. **ESPmode** - is the operating mode in which to run the ESP software
4. **ESLog** - is the root directory under which all data files are written
5. **ESPpath** - is a list of directory to search for mission scripts
6. **ESPconfigPath** - is a list of directories to search for configuration files

In the GUI, it can interface with one or more ESP, so basically, these variables should be stored with the instrument information. The strange thing about this is that they will only be applicable on the machine where the ESP software is running, which is NOT where the GUI will be running. The reason to have this information in the GUI however is that at some point the GUI will have to get access to the same source code tree and so even though the ESPhome and ESLog variables will be different, everything else will be relative to those root directories. Here is a logical deployment of the ESP network and a GUI client.



Interactions

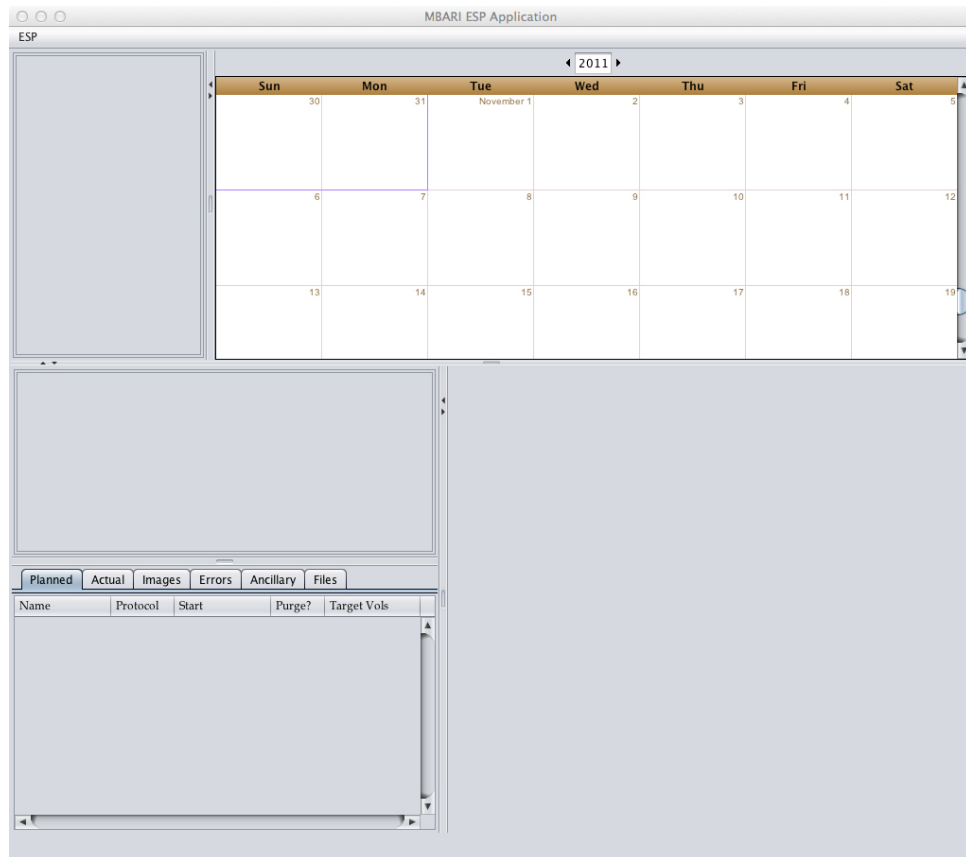
All of the ruby code for interacting with the ESP is located in MBARI's CVS system. In order to reference the ruby scripts, they need to be in the classpath for JRuby. I thought the best way was to have the user point to the head of the directory tree and then basically have the GUI crawl that and build the JRuby classpath dynamically.

The scripts that were active during the ESP's run will be co-located on the FTP server where the logs and images are stored. They will be in a folder called esp2local. So when a user is interested in synchronizing the GUI application with the current files on the shore based FTP station, it should create a local copy of all the files on the FTP directory so that it has a local place to get to the ruby scripts.

ESP GUI Users Guide

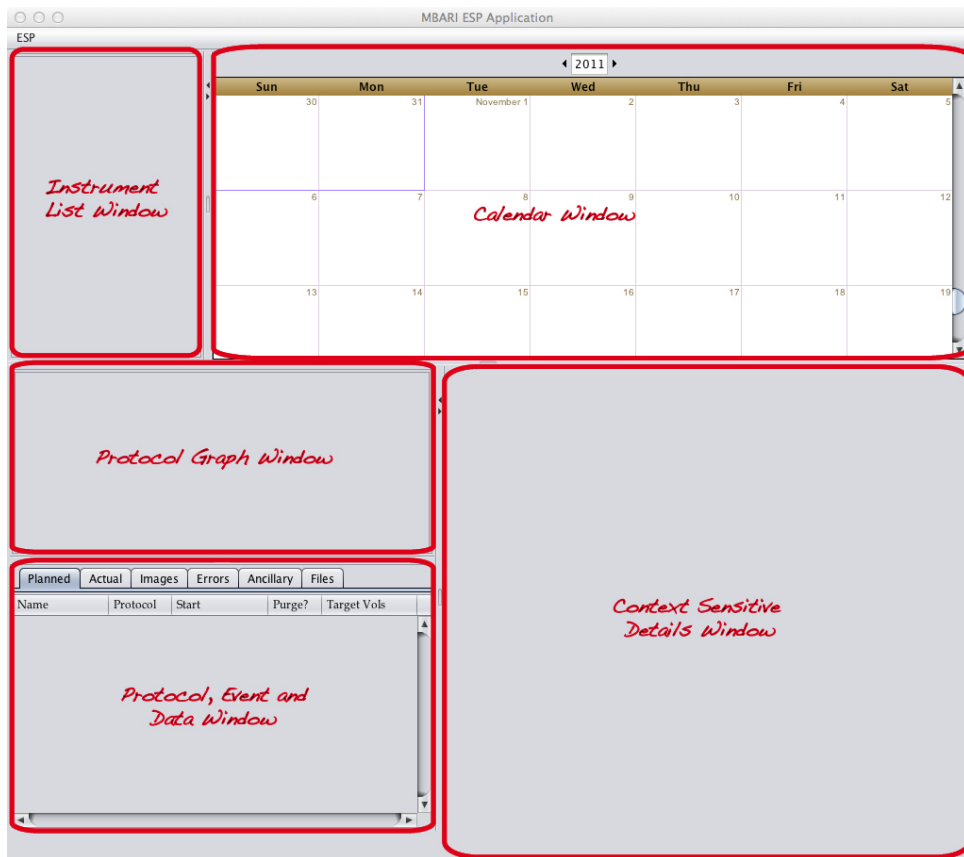
This page last changed on Oct 31, 2011 by [kgomes](#).

This is a quick sequence of steps to get the user up and running with the ESP GUI application. When you first start up the ESP GUI application, it will look quite bland (we are working on that) 😊.



There are five areas in the ESP GUI:

1. "Instrument List Window" (upper left corner)
2. "Calendar Window" (upper right corner)
3. "Protocol Graph Window" (middle left)
4. "Protocol, Event, and Data Window" (lower left corner).
5. "Context Sensitive Details Window" (lower right corner).



You will get the idea behind these windows as we work through these examples.

Configuration

Before getting started, it is best to take care of a couple of settings in the ESP GUI application. If you go to the **ESP** menu and select **Preferences...**, you will see some settings that are common across all instruments and missions.

The screenshot shows the ESP Application Preferences dialog box. It contains the following fields and controls:

- Local Storage:**
 - Directory: (with a browse button "...")
- WebDAV Storage:**
 - Protocol: (with a dropdown arrow)
 - Hostname:
 - Base URL:
 - Username:
 - Password:
 - Confirm:
- Buttons: and

The **Local Storage: Directory** field indicates the local disk path where the application will store copies of the various mission files that the GUI works with. It defaults to the user's home directory, but it can be changed. The GUI application will append a directory with the ESP's name and another directory for the mission name to divide up the local storage of mission related files. For example, in the above figure, the base local directory for data storage is `/Users/kgomes/esp_data`. If I create ESP named *Gordon* and create a mission for Gordon called *JuanDeFuca*, the files for that mission will be stored on the local disk in the directory:

```
/Users/kgomes/esp_data/Gordon/JuanDeFuca
```

In the **WebDAV Storage** section, these settings give the application the information it needs to store all the products and files for the various ESP's and their missions on a WebDAV server. This function was created to assist end users by allowing them to send their files to a central WebDAV repository where technical support could review them and offer assistance. Think of it as a way for the ESP to "call home".

1. **Protocol:** This will either be "https" or "http", but should really be https.
2. **Hostname:** This is the hostname of the WebDAV server where the files will be copied to. In MBARI's case we use an Alfresco content management server.
3. **Base URL:** This is the base URL where the files will be copied to. In this example, there is a WebDAV directory structure that looks like:

```
https://alfresco.mbari.org/alfresco/webdav/Data/ESP
```

which serves as the base for the file locations. Using the example above, if we have the ESP Gordon running a mission called "JuanDeFuca", the directory structure that will be created for the files is:

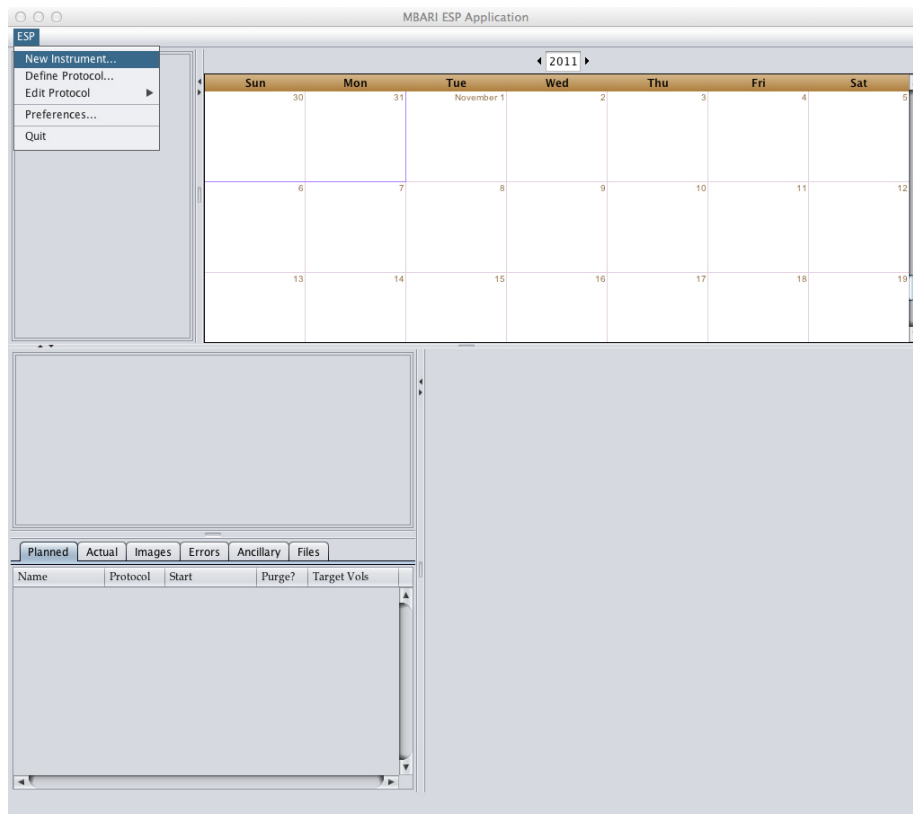
```
https://alfresco.mbari.org/alfresco/webdav/Data/ESP/Gordon/JuanDeFuca
```

4. **Username:** The login to the WebDAV server
5. **Password/Confirm:** The password to use for the WebDAV login.

Mission Planning

The first function of the GUI is to plan a mission for your ESP. In order to do this, there are a couple of steps that need to be taken as initial setup so you can generate mission plans. You must first create the instrument itself, and then you must define various protocols that can be placed in a mission plan. First let's create a new instrument.

1. In the **ESP** drop down menu, select the **New Instrument...** option.



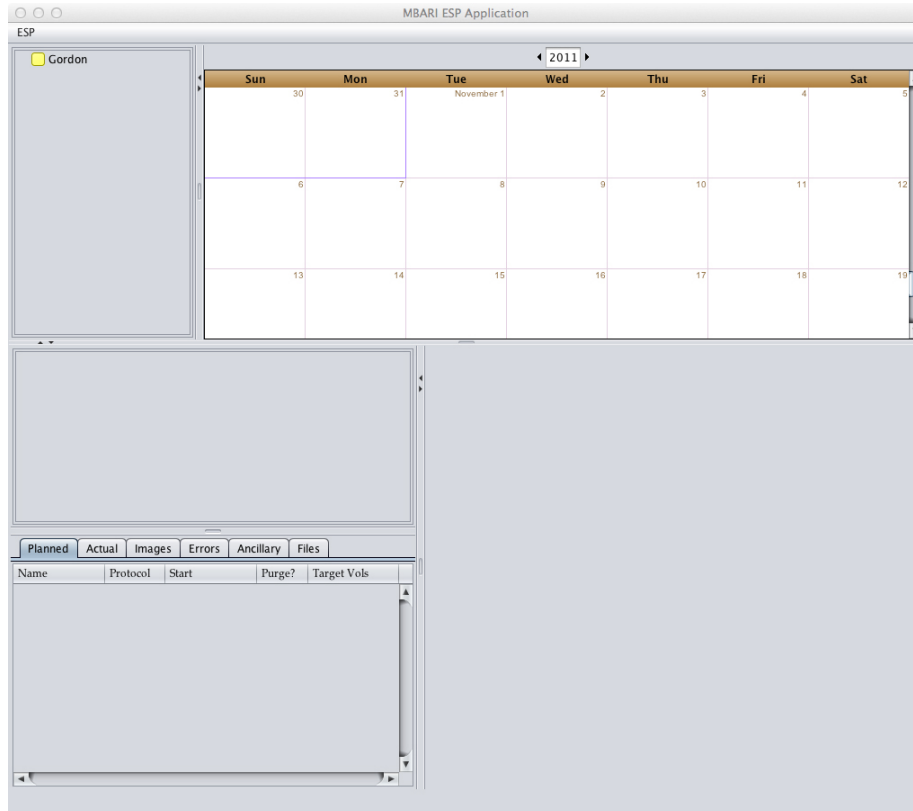
2. A dialog window will appear that prompts you for the information about the ESP that you are using. In this example, we are using the ESP named 'Gordon' with a serial number of '1' and we chose a yellow color. Click on 'Save' to save the information you entered.



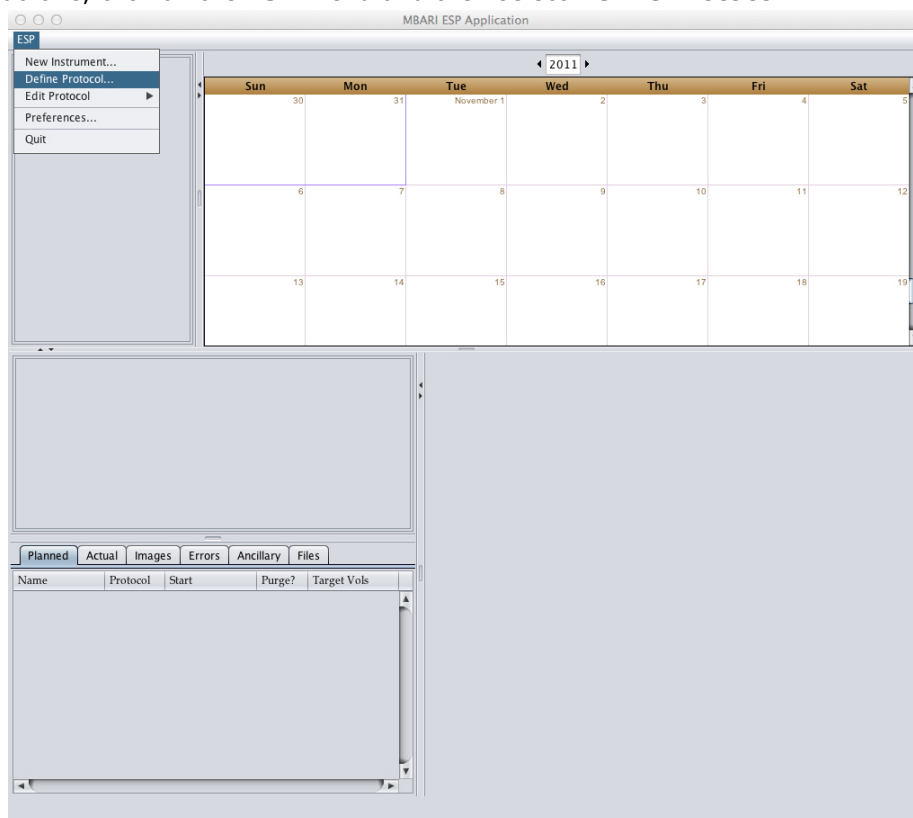
Instrument FTP not used yet

Please note that while, in theory, you could use the GUI and point it to the FTP server on the instrument itself, it has not been implemented as there is some discussion about whether you would ever want to do that. We use a shore station FTP server that keeps all the files in sync with the instrument itself and then point the GUI to that FTP server (this will be shown later). For the time being, just leave all the FTP fields blank.

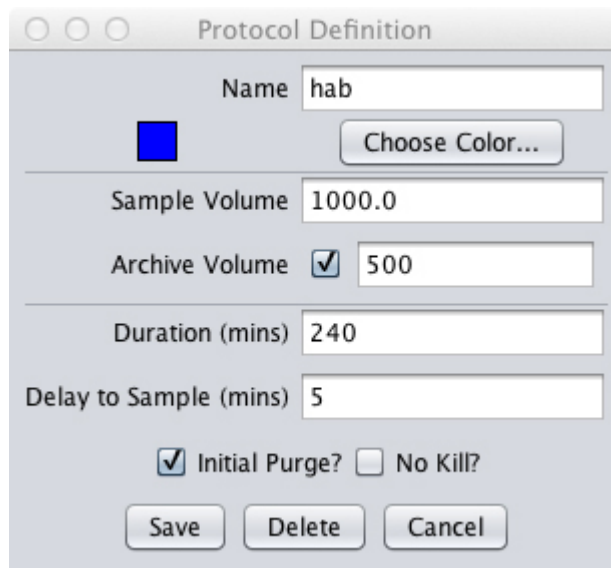
3. Once you save the information, you will see your new instrument definition in the GUI.



4. Now that the instrument is defined, we must define the various protocols that the instrument will be running. To do this, click on the **ESP** menu and then select **Define Protocol...**



This brings up a dialog where you can edit a new protocol that can be used in planning an ESP mission.



The image shows a 'Protocol Definition' dialog box with the following fields and controls:

- Name:** A text field containing 'hab'.
- Color Selector:** A small blue square next to a 'Choose Color...' button.
- Sample Volume:** A text field containing '1000.0'.
- Archive Volume:** A checkbox (checked) followed by a text field containing '500'.
- Duration (mins):** A text field containing '240'.
- Delay to Sample (mins):** A text field containing '5'.
- Initial Purge?:** A checkbox (checked).
- No Kill?:** An unchecked checkbox.
- Buttons:** 'Save', 'Delete', and 'Cancel' at the bottom.

In the figure, we have defined a new protocol with the name 'hab'. NOTE: The color selector was used in an older version to display on the calendar but is no longer used and will be removed in the future, you can ignore the color chooser. The default sample volume was chosen as 1000ml. The checkbox next to **Archive Volume** indicates that an archive should be performed after the protocol and it will use a sample volume of 500ml. For mission planning purposes, it is good to define an approximate length (in minutes) that the protocol normally takes to run (in this case we chose 240 minutes). The **Delay to Sample** field indicates the approximate amount of time it takes between when this protocol is started by the ESP and when the sample should actually start to draw water from the environment (in this case 5 minutes). The **Initial Purge** checkbox tells the ESP to perform an initial purge when this protocol is run (selected in this case) and the **No Kill?** checkbox indicates if the kill step should be skipped (in this case the kill step is going to happen). Remember that when you are defining a protocol in this step, you are defining a *template* of the various protocols you will use to plan your mission. When you actually plan your mission, you will be given an opportunity to customize each of these settings.



Protocol Name is Critical

The name that you assign to the protocol is REALLY important as that is the name that will be placed in the generated missions script and should match a protocol that has been defined in a ruby script on the machine. For example, if there is a 'hab.rb' script on the ESP that you would like to use in your plans, make sure you define the protocol name as 'tab'.

5. I did not go through each step here, but using this technique, I defined the following protocols

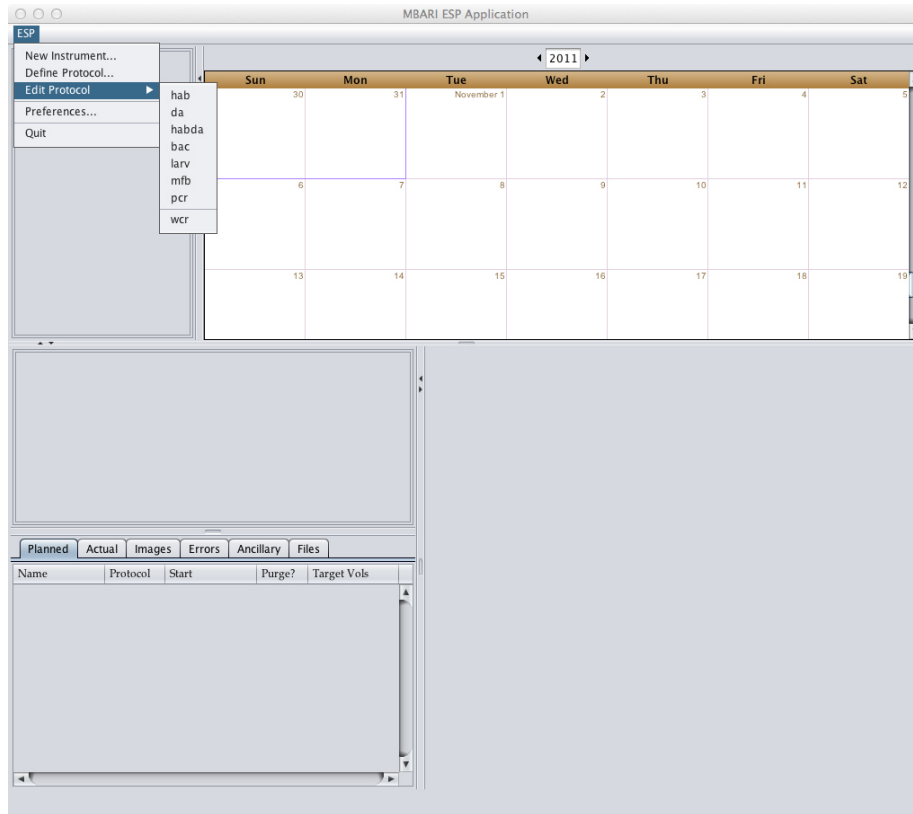
Name	Sample Volume	Archive Volume	Duration	Delay to Sample	Initial Purge	No Kill?
hab	1000	500	240	5	✓	
da	1000	nil	300	7	✓	
habda	1000	500	240	5	✓	
bac	1000	500	200	3	✓	
larv	1000	500	55	10	✓	
mfb	500	nil	180	30	✓	

pcr	1000	500	120	0		
-----	------	-----	-----	---	---	--

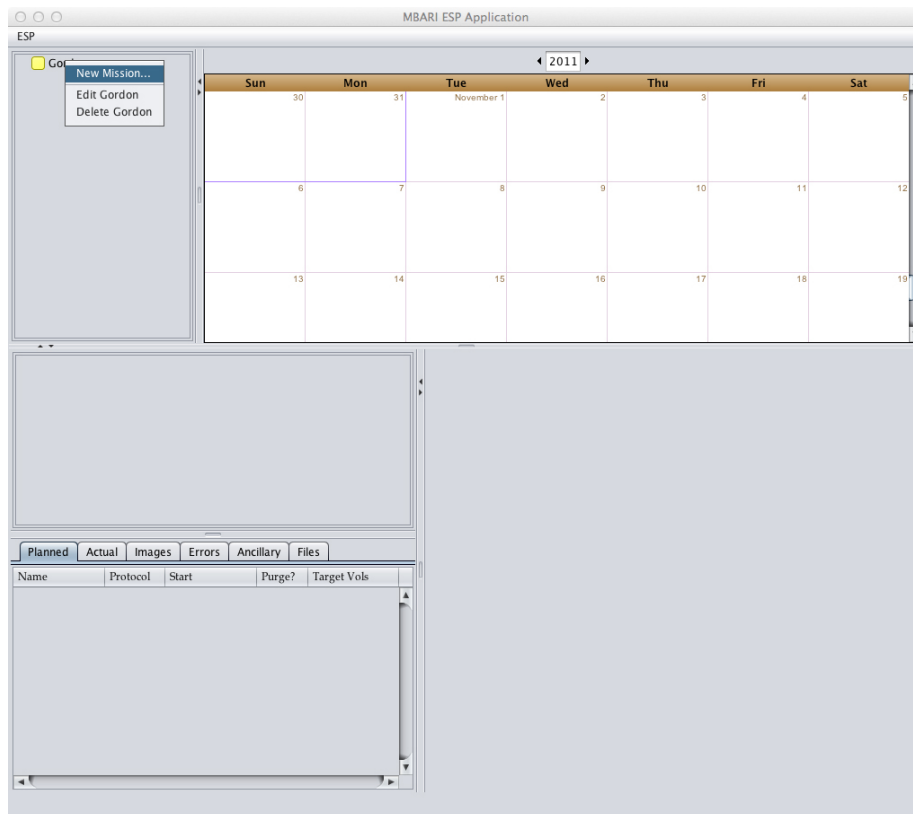


wcr created for you

The ESP GUI will automatically create the archive protocol 'wcr' for you.

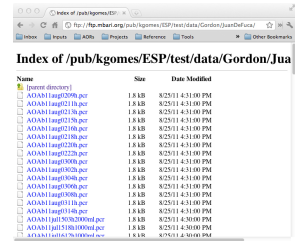


- Now we are ready to create a mission for the Gordon ESP. Mouse over the instrument you want to create a mission for in the instrument window and right-click on it, then select **New Mission....**



7. This brings up a dialog window that allows you to fill in the information related to the mission that the ESP will be executing.

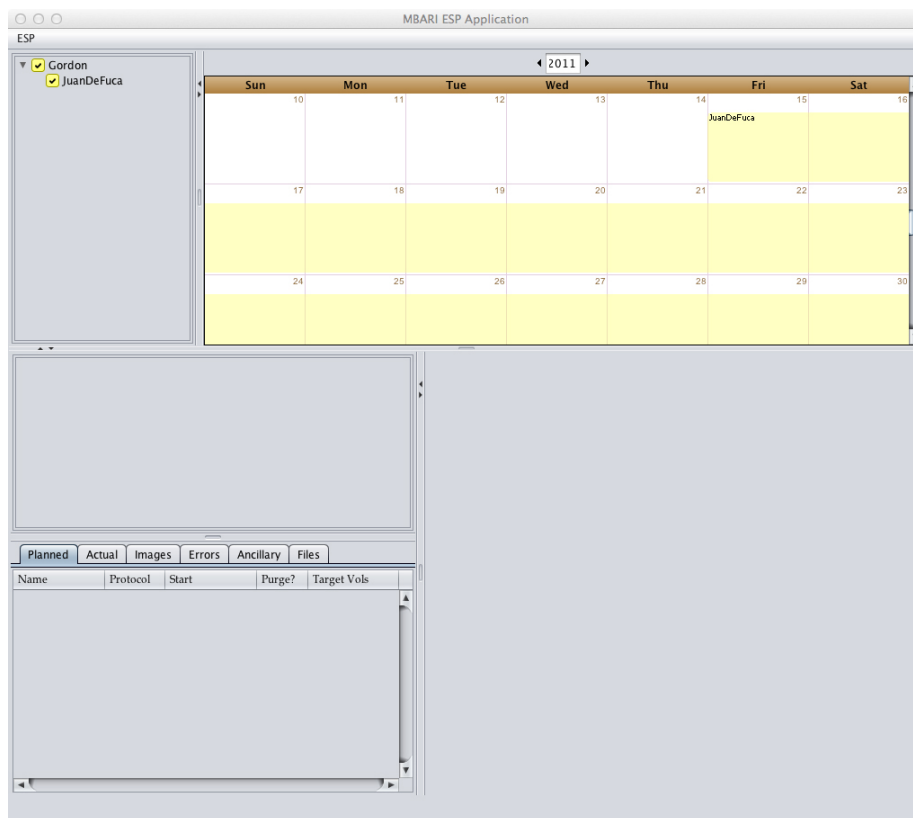
Field	Description	This Example
Name	This is a user friendly name that you want to call you mission. One thing to note with this name and the instrument name is that the GUI will use the name of the instrument and the mission as a directory structure on your local machine to store local copies of all the files that the ESP produces/uses. For this reason, we don't allow spaces in mission names.	In this example, we simply chose <i>JuanDeFuca</i>
Latitude	This is the latitude where the ESP will be deployed	43.031757

Start Tube	This is the tube that will be used when this mission is started.	2
Longitude	This is the longitude where the ESP will be deployed	-126.752014
Type	This is a drop down selection of a few available types of mission: Shallow, MFB, 1km, 4km	4km
Depth	The depth at which the ESP will be deployed	1000m
Start Date	This is the date and time of the start of the mission	7/15/2011 00:00:00
End Date	The date at which the mission will end	8/31/2011 00:00:00
FTP Hostname	This is the hostname of the FTP server which will host the files that the ESP is generating during its mission. This FTP site is used to pull down the files to your local machine for analysis	ftp.mbari.org
Mode	The mode the mission will be running in. This is most likely "real", but there are "Simfast", "Simreal", and "Quick" modes as well	real
FTP Root	This is the base directory on the FTP server where the ESP will be recording it's files. This is usually where the log file is located.	In this example, the complete FTP URL to the data is: ftp://ftp.mbari.org/pub/kgomes/ESP/test/data/Gordon/JuanDeFuca which means the host is <code>_ftp.mbari.org</code> and the FTP Root is <code>/pub/kgomes/ESP/test/data/Gordon/JuanDeFuca</code>. A sample of what the directory contents for a mission might look like, see the figure below. 
Home Path	Not used	
FTP Username	This is the username that will be used to connect to the FTP server	anonymous
Config Path	Not used	

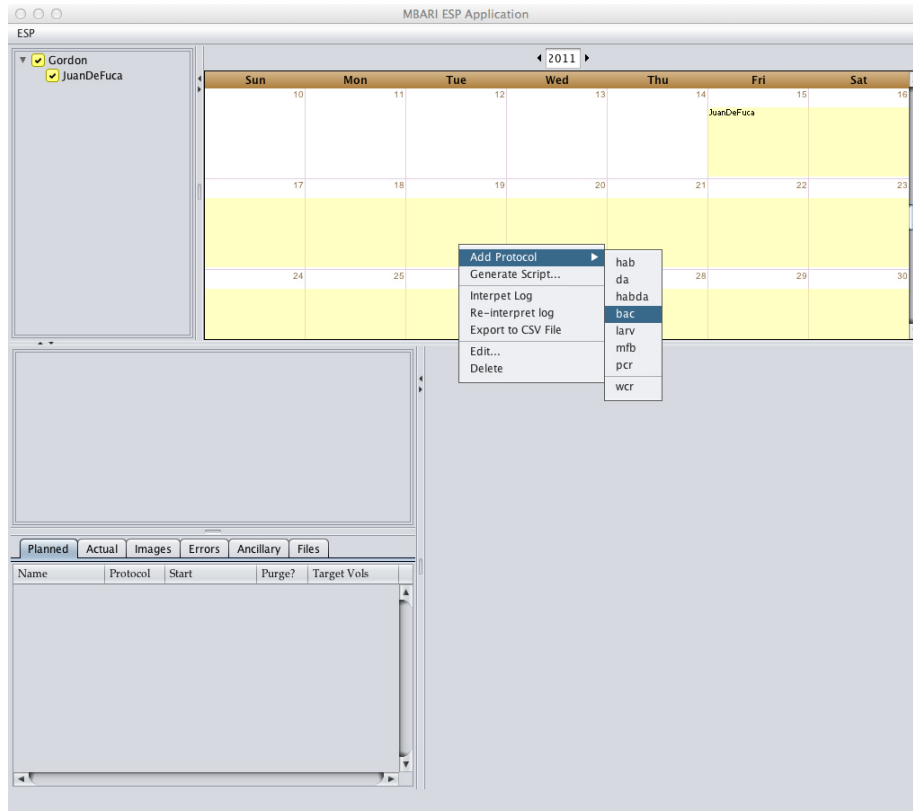
FTP Password	This is the password that will be used to connect to the FTP server	
Log Path	This is the path on the ESP itself where the files are begin written (images, real.log, .pcr, etc.). This is used by the GUI when it parses the log file looking for information as it needs to know where to find files in the FTP structure.	/var/log/esp
Log File	This is the name of the file that is being written to by the ESP during its operation	real.log
Path	Not used	

When all the information is filled out, click on "Save" to save the mission.

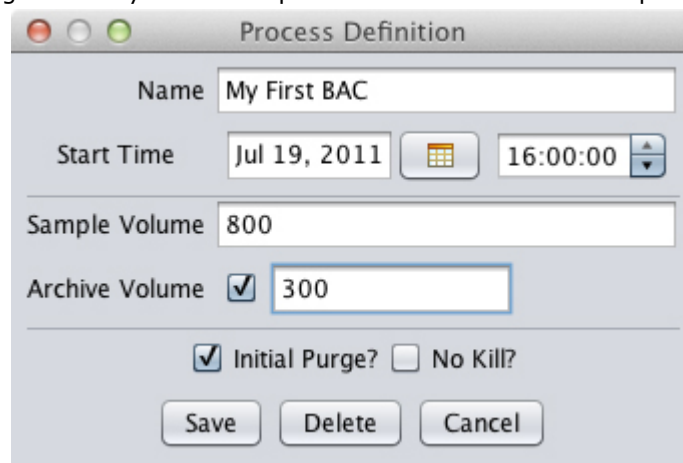
8. In the instruments window, if you now click on the arrow to the left of the instrument (Gordon) you will see a tree view with your new mission listed below.
9. Click on the check box next to the mission (JuanDeFuca) to bring the mission into view in the Calendar Window.



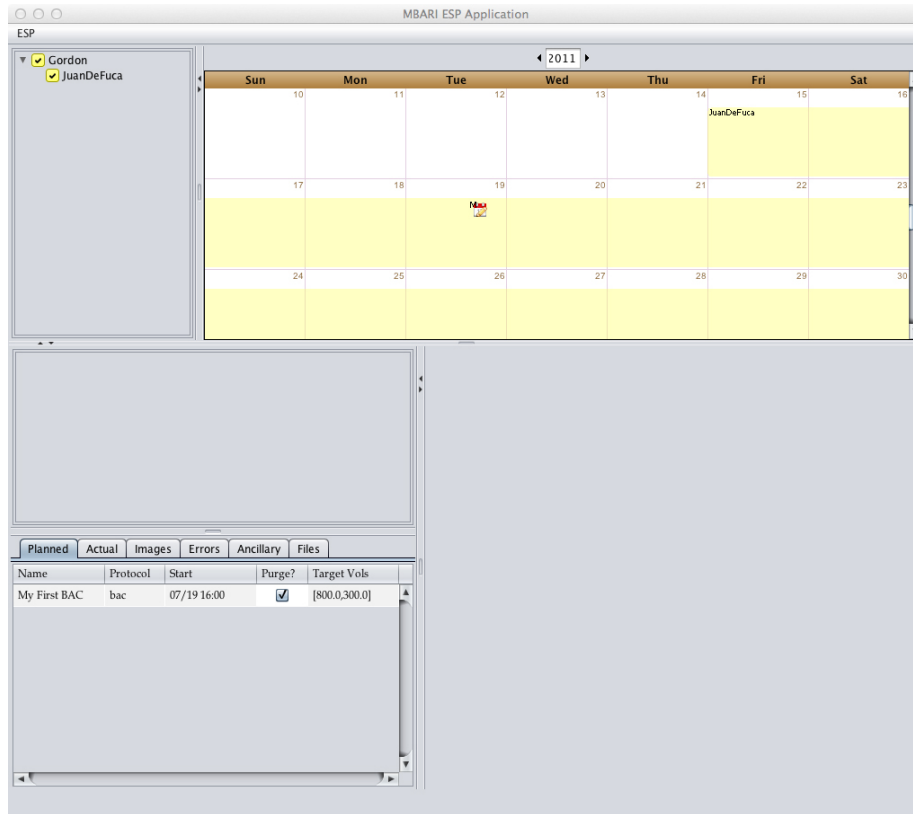
10. Now it is time to add some protocols to your mission! If you right click on the calendar at the approximate time that the protocol is to run, you will get a context menu that will allow you to select the protocol you will to insert into the mission. In the figure below, we are adding a "bac" protocol in the afternoon of the 19th of July.



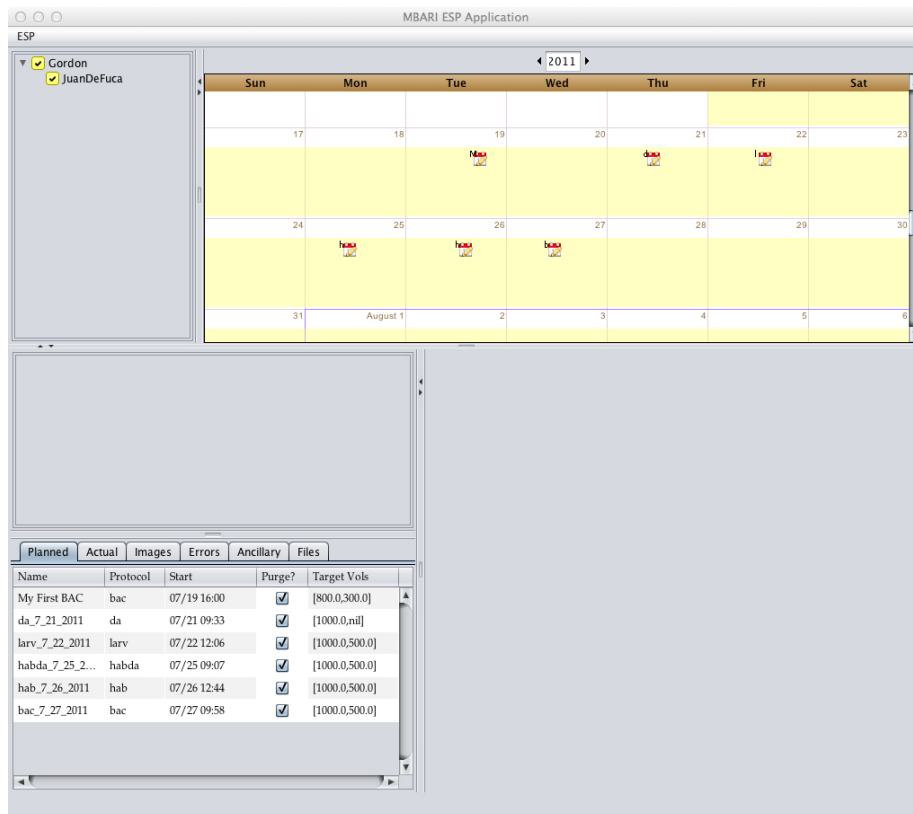
11. This brings up a dialog to allow you to edit specific information about this protocol run.



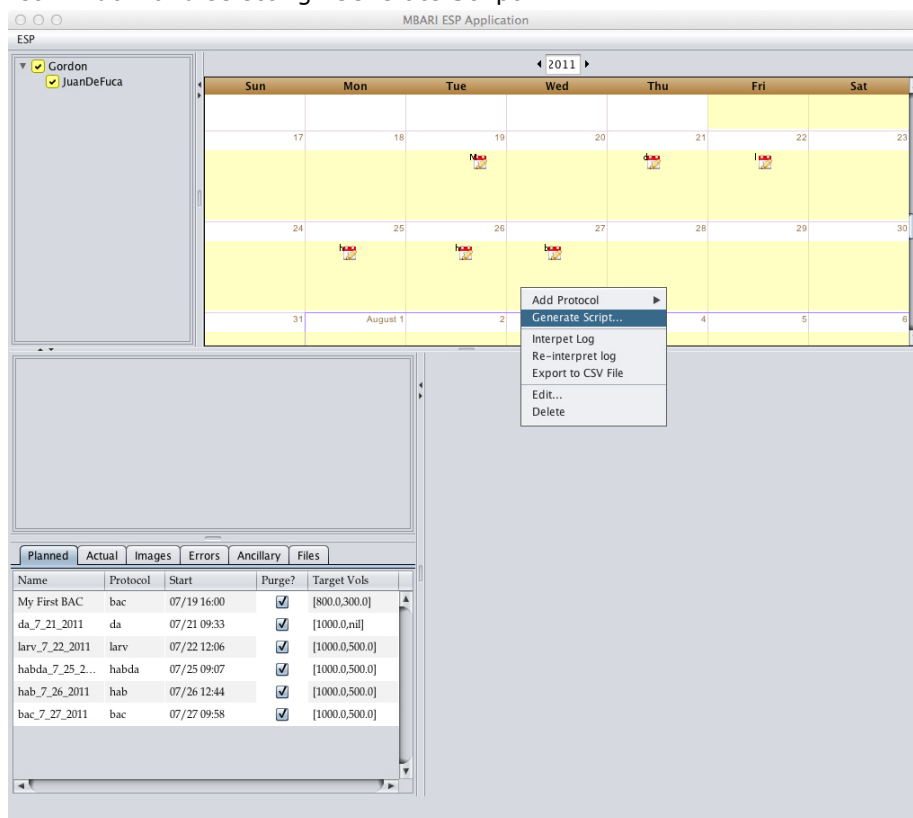
12. I changed the name to something meaningful to me and then changed the time, sample volume and archive volume to match what I wanted for this particular run of the bac protocol. Then click on "Save" to save the protocol in the mission.



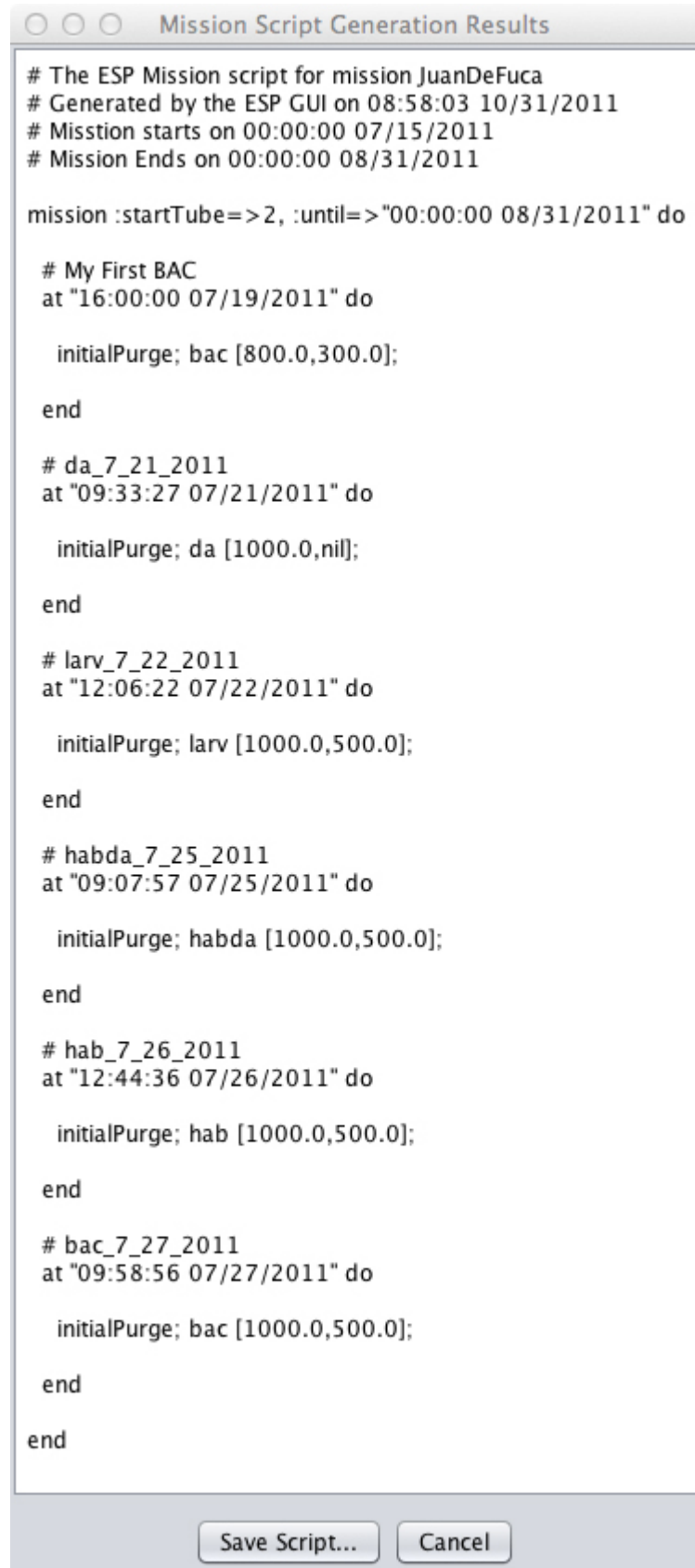
13. What you now see is a small calendar icon in the upper portion of the colored mission bar on the calendar. It is placed at the top of the mission bar to indicate that it is a planned protocol, not one that was extracted from the log file (which you will see later). Also, the small pencil on the icon means that it is a planned protocol, not an actual one. The small letter at the front of the icon is used to help distinguish which protocol this is. It is simply the first letter of the name that you gave the protocol. You will also notice the list of "Planned" protocols in the lower left pane shows the list of protocols you have planned so far. I used the same method to add 5 more protocols to the mission plan as an example.



- Once you have the mission the way you like it, you can generate the ruby script that will execute the mission on the ESP by right-clicking on either the mission in the Calendar Window or in the Instrument List Window and selecting "Generate Script...".



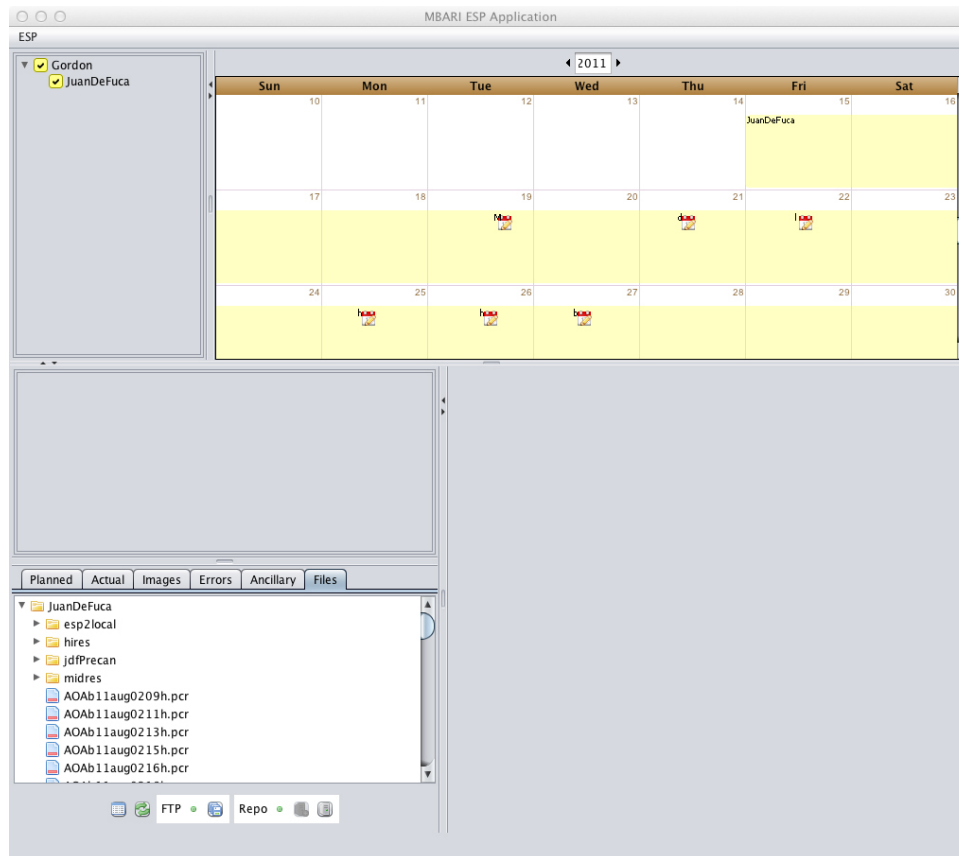
- This opens a window that displays the script and gives you an option to save it to your local disk somewhere (click on "Save Script...") to do this.



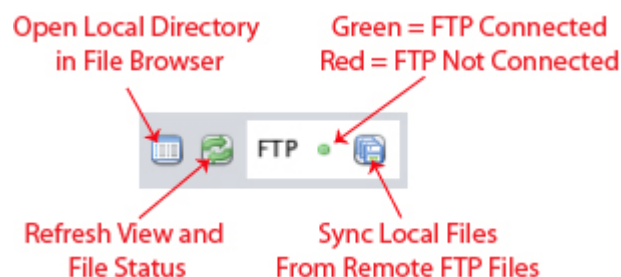
Data Management and Analysis

Once your mission is underway, the ESP GUI can be used to look at and analyze the data that the ESP is generating. Once the ESP starts generating logs, images and files, you should see them show up in

the FTP site that you defined in the mission planning portion above. Continuing with that example, if I start the GUI, expand the arrow next to "Gordon" and then select the checkbox next to the "JuanDeFuca" mission, it will appear in the calendar view. With that selected, let's look a little closer at the Protocol, Event and Data Window. As mentioned above, the first tab "Planned" shows you the protocols that have been planned for this mission (what you created earlier). You can select the "Actual" tab, but will not see anything yet as we have not parsed the log file from the ESP to see what has actually happened out there. The same goes for "Images", "Errors" and "Ancillary". Nothing will show in these tabs until the GUI has had an opportunity to parse the information out of the log file that the ESP generates (which we will do shortly). Which brings us to the "Files" tab.

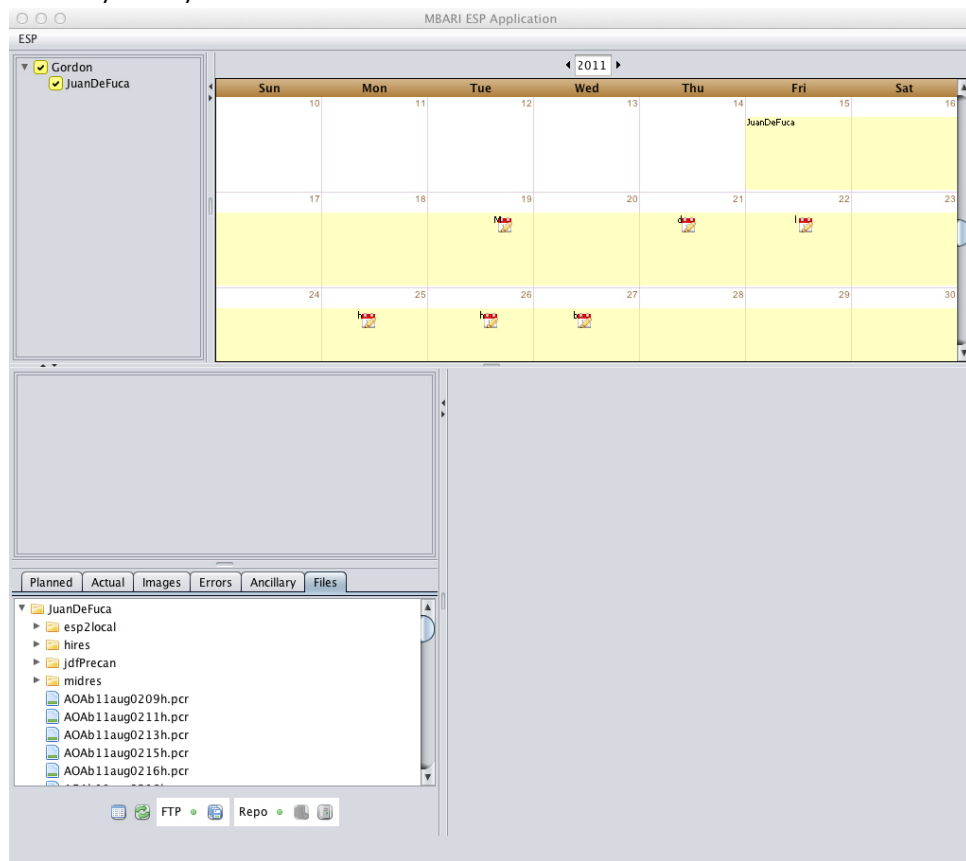


The Files tab is a tree view of the combination of the files both in your local directory and on the remote FTP server. In this case what you can see is that all of the files listed here are available on the remote server but not on your local disk drive. This is indicated by the icon having red bar on the bottom. If the icon has a green bar only it is both on the remote server and on your local disk and the two are in sync. If the icon has a green bar and two small arrows it means that the file is located both on your disk and on the remote server, but they are out of sync and in need of a re-sync. If the icon has no color on it, it is on your local disk and not on the remote server and nothing needs to be done. Let's examine what your options are at this point.

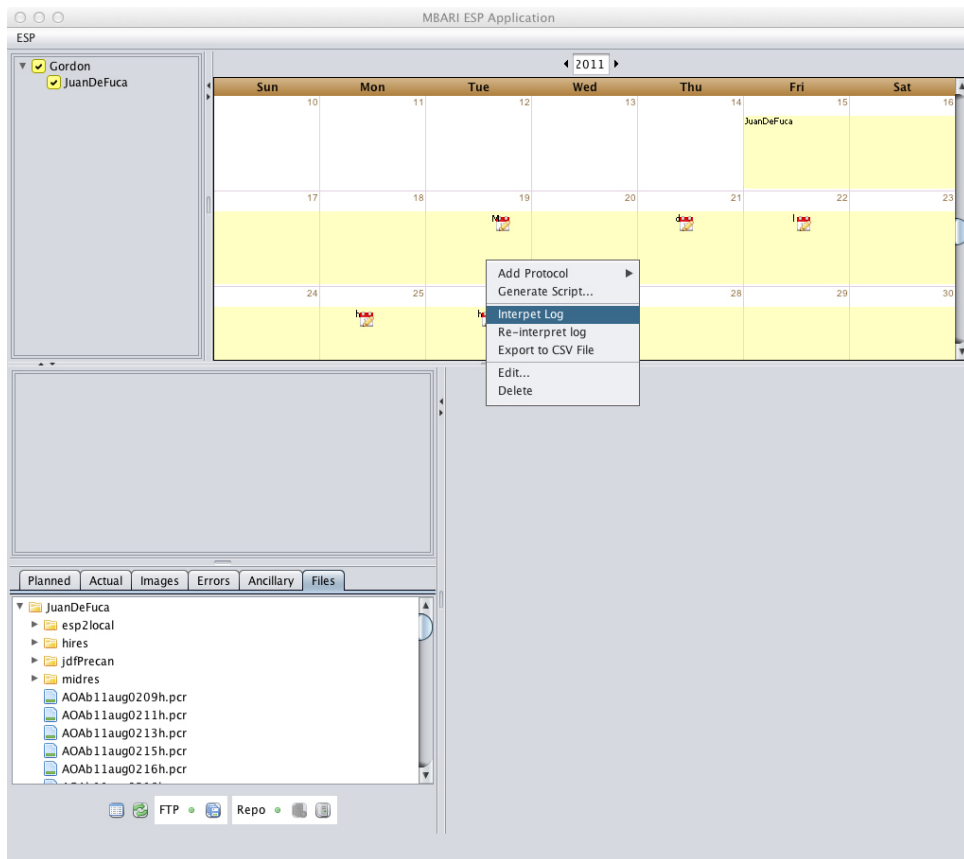


The above figure shows some the control panel for the file synchronization with the FTP server. The first button will simply open the directory on your local disk where the files are being stored so you can find them easily in your file manager. The second button simply examines the remote and local file directories and refreshes the view of their status. Assuming the light is green (and not red which would indicate that there is something incorrect with the FTP configuration in the mission and the GUI cannot connect to the FTP server), the last button will pull down the most recent version of the remote files on the FTP server and synchronize your local files to those on the remote FTP server. Depending on your connection and the

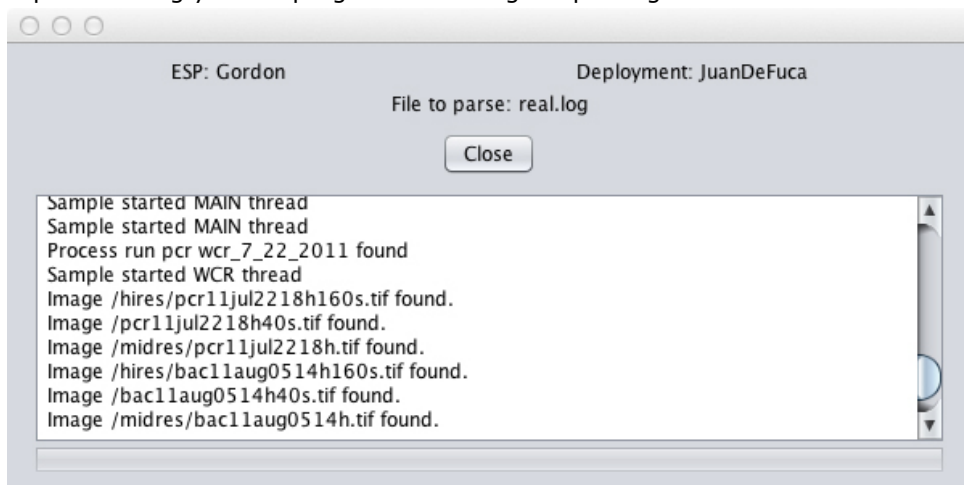
size of the files, this can sometimes take a while to perform. Once this is done, all the files should show green to indicate they are synchronized with the FTP server.



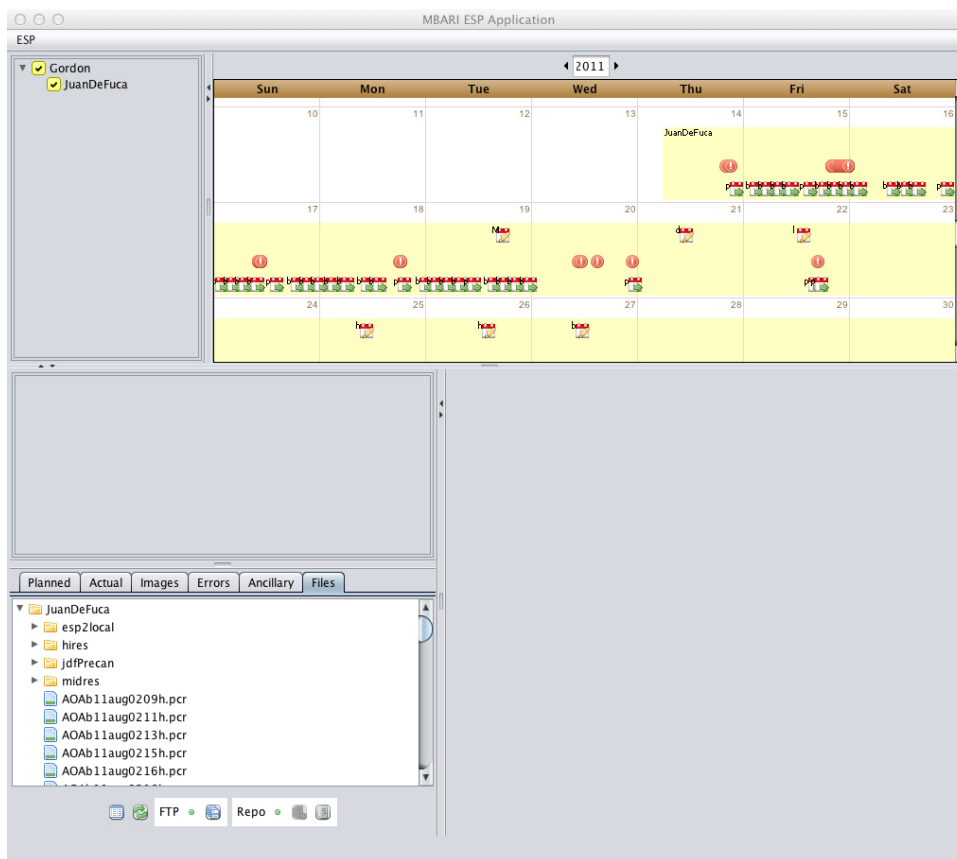
After the sync, you should see copies of the files on your local hard drive. Now with the files synchronized locally, you can tell the GUI to go ahead and parse the log file for information about protocols, samples, images, ancillary data, etc. This can be done by right-clicking on either the mission in the Instrument Window or in the Calendar Window and selecting **Interpret Log**.



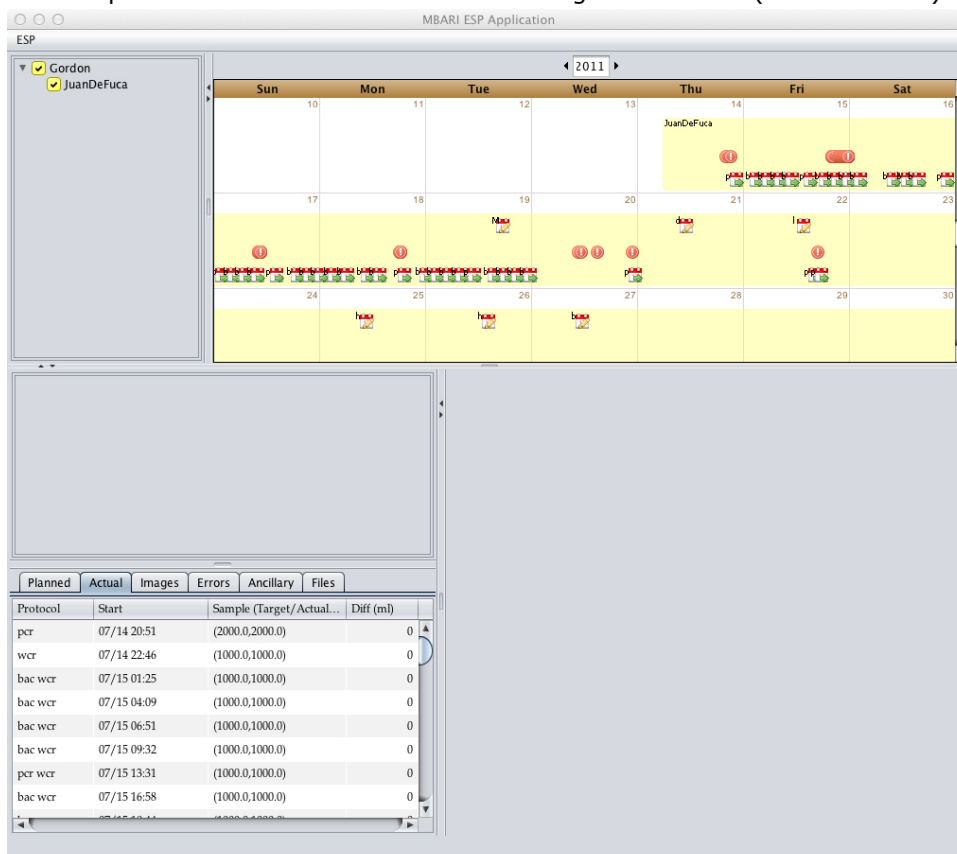
A window will open showing you the progress of the log file parsing.



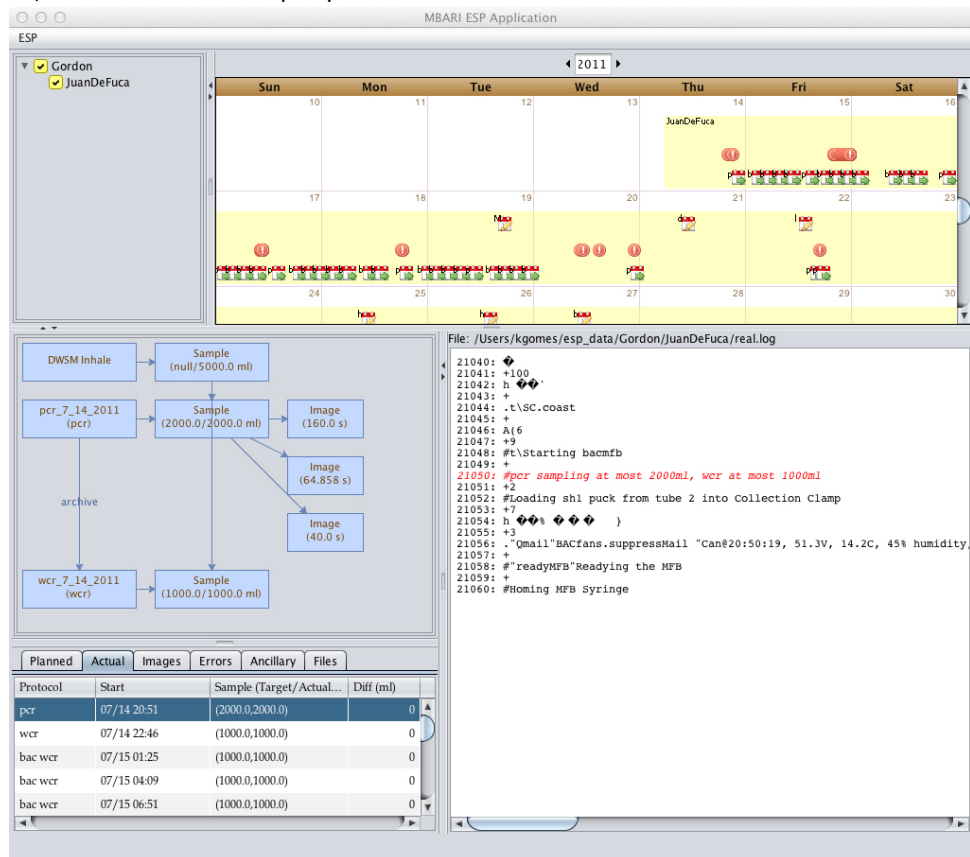
Once the log interpretation is complete, you should see many more things in the calendar view. In the figure below you will notice several new things. The exclamation points in the middle of the mission bar on the calendar indicate an error during the run of the ESP and the calendar icons with green arrows at the bottom of the mission bar indicate protocols that were found in the log file.



At this point, we can begin to explore some information about the currently deployed ESP. If you select the "Actual" tab in the lower left pane, you will see the list of protocols that were interpreted from the log file. You see the name of the protocol, the start date and time, the target/actual volumes of the associated water sample and the difference between the target and actual (if there is one).



If you click on the protocol either in the calendar view or in the "Actual" table, you will see more details about the protocol in both the Protocol Graph Window and in the Context Sensitive Details Window. In the following figure, I selected the first pcr protocol.



In the Protocol Graph Window you can see some details about the various related artifacts. In this example, since this is from the Deep ESP, you can see that the water sample associated with the PCR itself was extracted from a DWSM sample. You can also see the associated images that were taken of the analyzed sample associated with the PCR. The WCR that is shown gives you the information that there was indeed an archive performed in association with this PCR. In the context sensitive details window on the lower right side of the screen you can see the entry in the log file that the PCR protocol was extracted from. If you select one of the images in the graph or switch to the "Images" tab, you will get more information about the image you have selected.

MBARI ESP Application

ESP

☒ Gordon
☒ JuanDeFuca

2011

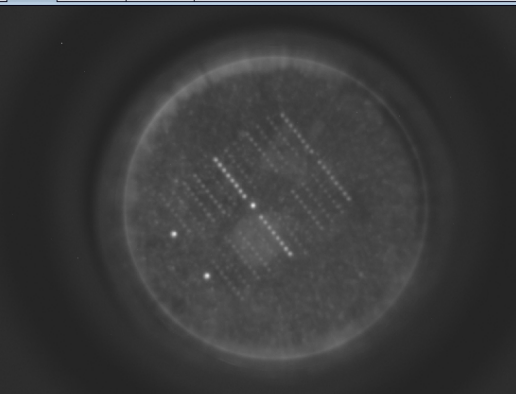
Sun	Mon	Tue	Wed	Thu	Fri	Sat
10	11	12	13	14 JuanDeFuca	15	16
17	18	19	20	21 JuanDeFuca	22 JuanDeFuca	23 JuanDeFuca
24	25	26	27	28	29	30

DWSM Inhale → Sample (null/5000.0 ml)
 pcr_7_14_2011 (pcr) → Sample (2000.0/2000.0 ml) → Image (160.0 s)
 pcr_7_14_2011 (pcr) → Image (64.858 s)
 pcr_7_14_2011 (pcr) → Image (40.0 s)
 wcr_7_14_2011 (wcr) → Sample (1000.0/1000.0 ml)

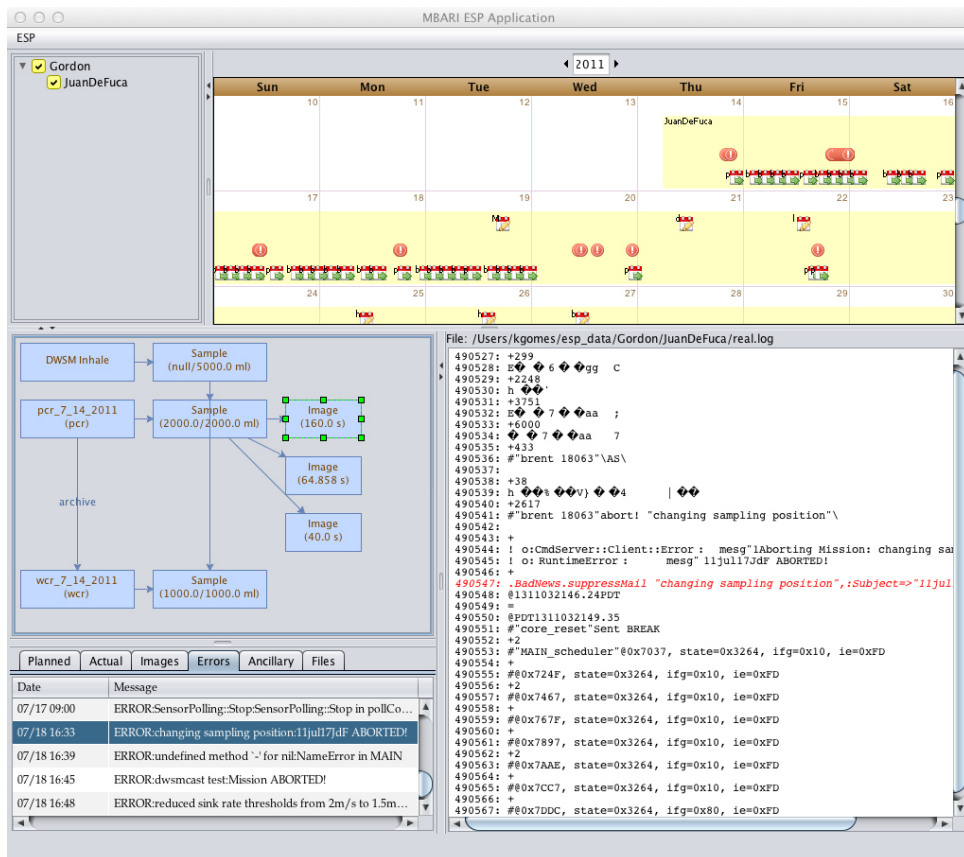
Image Metadata Log Entry

Planned Actual Images Errors Ancillary Files

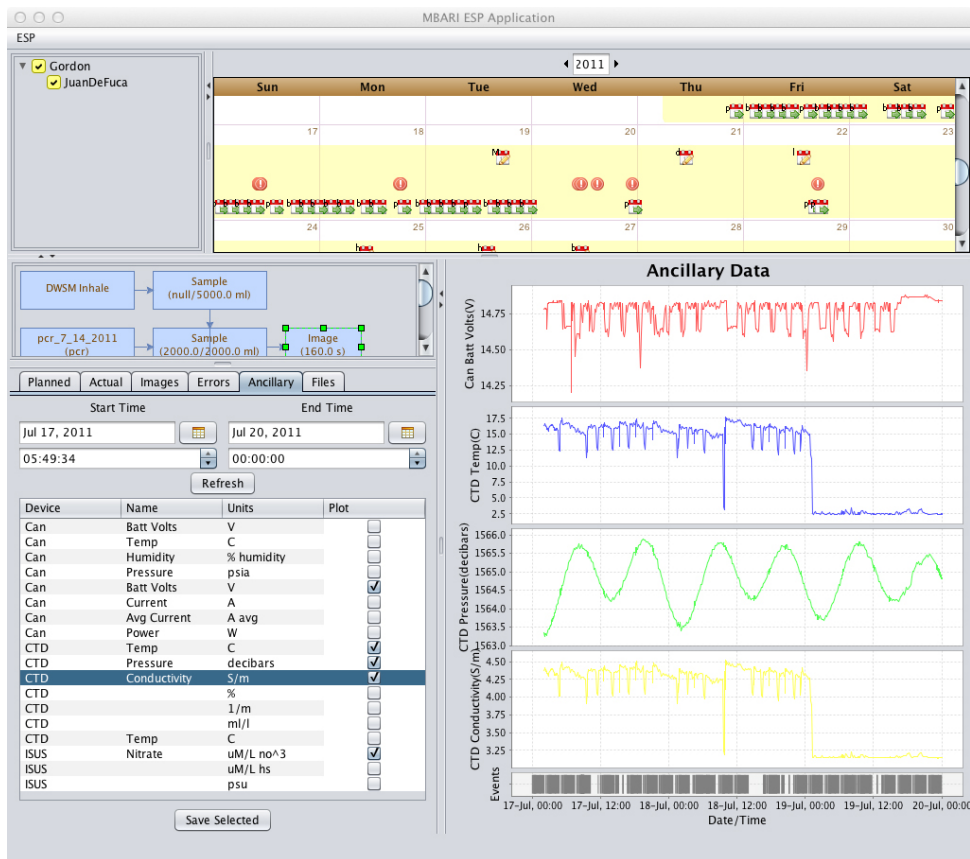
Name	Date	Exposure
pcr11jul1500h2000m1160s.tif	07/15 00:03	160
pcr11jul1500h2000m140s.tif	07/15 00:04	40
pcr11jul1500h2000m1.tif	07/15 00:05	64.858
pcr11jul1515h1000m1160s.tif	07/15 15:34	160
pcr11jul1515h1000m140s.tif	07/15 15:35	40



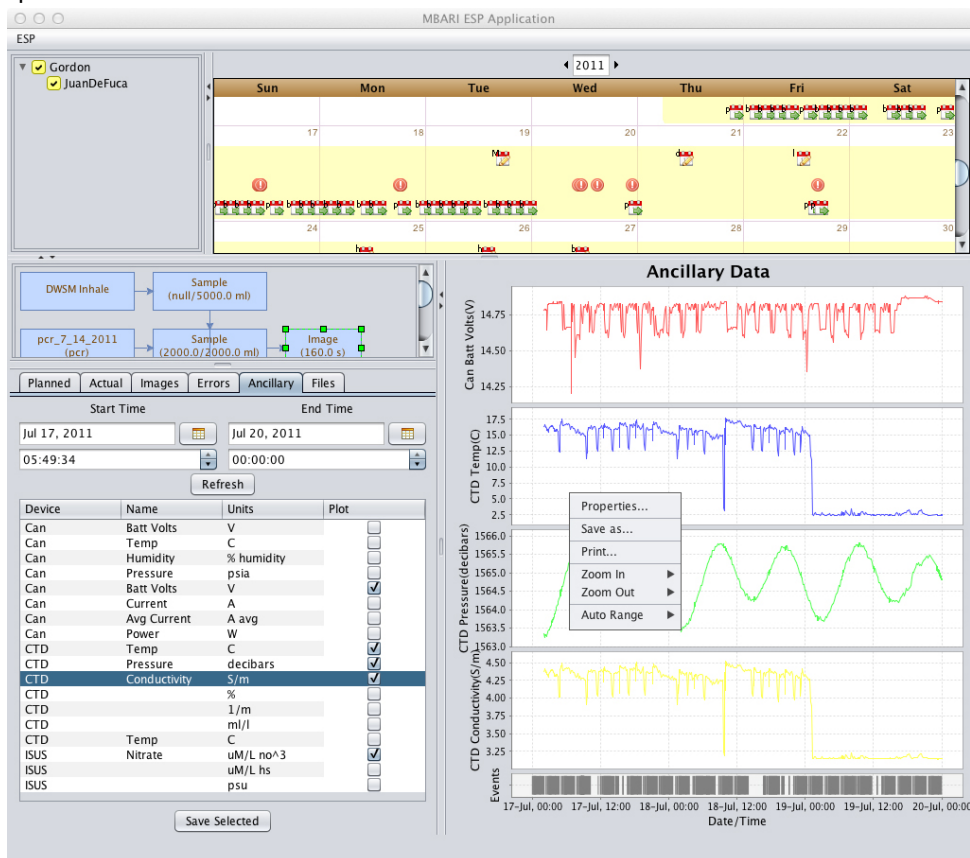
The image tab shows a table with some information about the selected image such as the date and time it was taken and the exposure that was used. In the context sensitive details panel, you can see the image itself and if you select the "Metadata" tab you will see the information extracted from the TIFF image itself. The "Log Entry" tab shows the location in the log file that this entry was extracted from. Next if you select an Error exclamation point in the calendar view, or switch to the "Error" tab, you will get more information about the errors that were discovered in the log file.



In this example, you can see the error is the abort of the mission and when that error occurred. In the context details window, you can see the log entry with a window of lines on both sides of the entry so you can see the context in which the error occurred. If you select the "Ancillary" tab, you can get information about the ancillary data that was extracted from the log file. This is the data the is logged by sensors in the ESP itself in addition to other contextual sensors that are attached to the ESP and are logging their data through the ESP. In the example shown below, there is data available from the ESP Can itself as well as from an associated CTD and an ISUS. If you select an appropriate time window (for this example, I chose Jul 17 through July 20, then choose the variables you are interested in and click "Refresh", you will see a plot of the various data in the context sensitive details window.



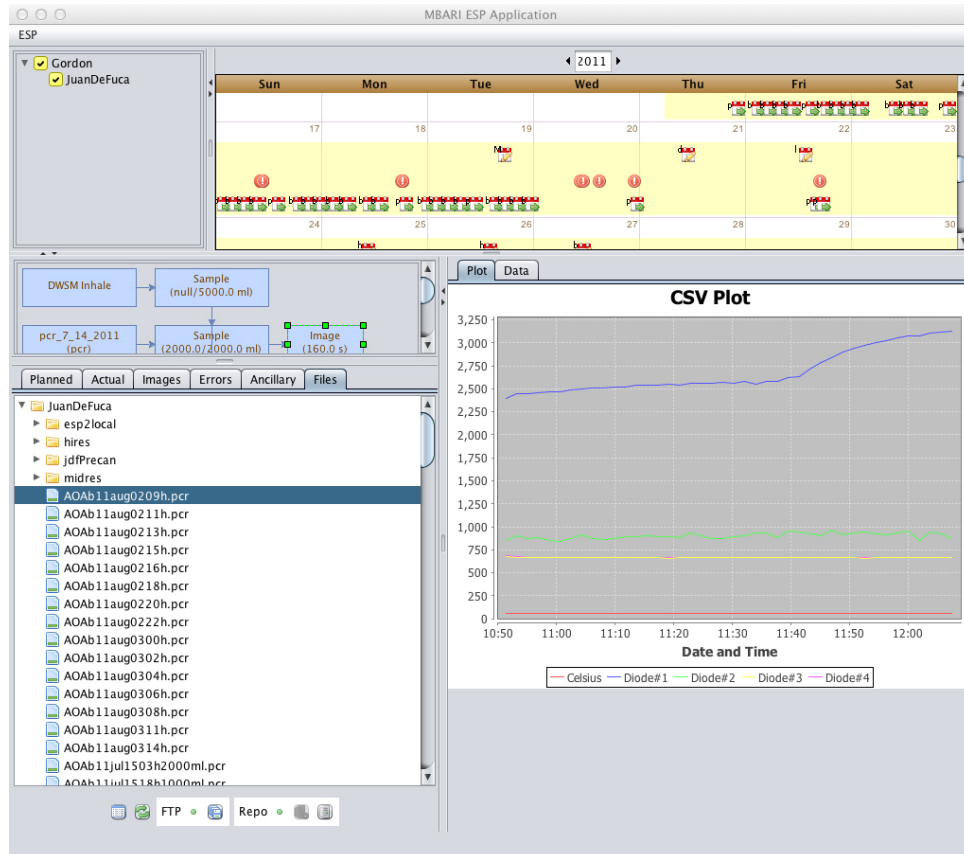
If you right-click on the plot itself, you will be presented with some options to save, print or zoom/pan the ancillary data plots.



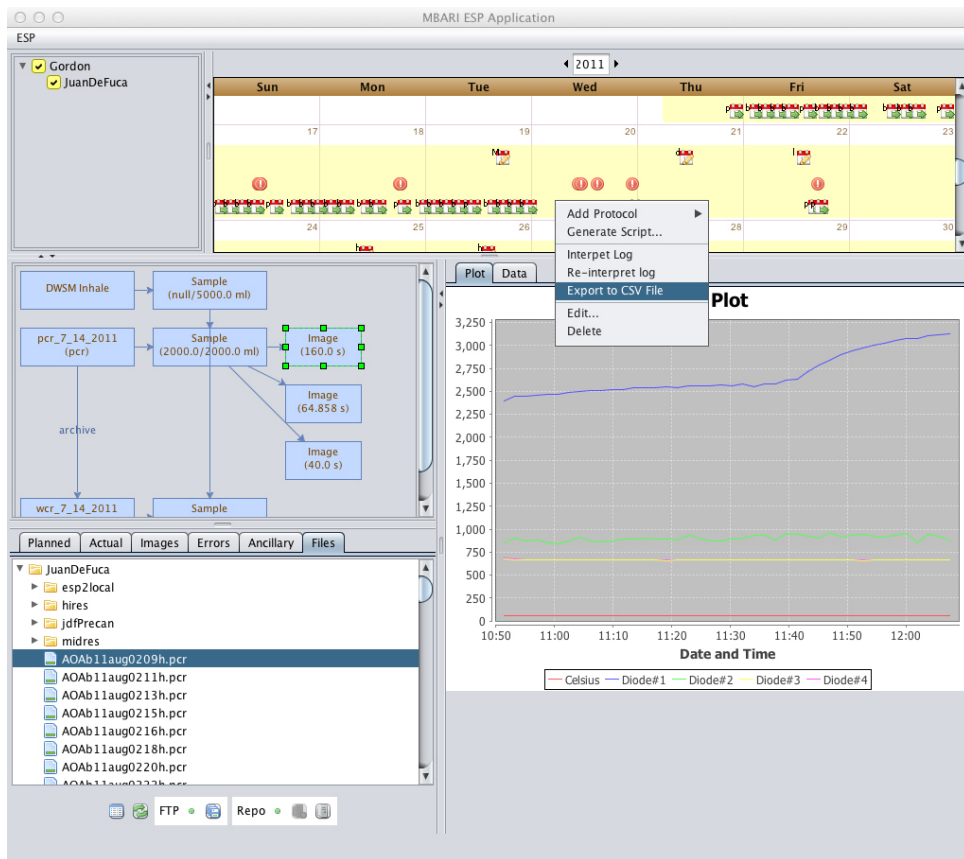
If you want to save the data that you have plotted, in the left window, click on the "Save Selected" button and it will present you with a file dialog so you can save a comma separated list of data points to

your disk somewhere for further analysis. Note that in the resulting CSV file, the dates and times of the different data do not align and so where there is not data "N/A"s are inserted as excel understands those as no data.

Another thing that may be helpful, is that if you select on the "Files" tab again, and if there are any files that are PCR results (i.e. end in .pcr), you can select those to see plots and tables of the data in the PCR results file in the context sensitive details window.



Lastly, if you are interested in a CSV formatted file of the information from the ESP mission, you can right-click on the mission in the calendar view and select "Export to CVS File" which will give you a dialog box to save a CSV formatted file with some of the information from the mission to date to your computer.



ESP Java GUI

This page last changed on Dec 02, 2014 by [kgomes](#).

The original ESP GUI was a Java application that was connected to a SQL database. Here are the use instructions for that application (some links don't work).

1. *MBARI Central DB*: Use this one if you want to run the GUI against the central MBARI database hosted on a Microsoft SQL Server.
 - a. Launch using [JNLP](#)
 - b. Download the [GUI Application](#) and launch by:
 - i. Command line: 'java -jar esp-gui-0.2-SNAPSHOT-jar-with-dependencies.jar'
 - ii. Or you should be able to double click on the jar in most cases.
2. *Localhost*: Download this version if you want to run the GUI and have it point to a local installation of a MySQL database
 - a. Download the [localhost version](#) of the application
 - b. If you have not setup the mysql database before, you will need to use the command line mysql client to create the database, user and assign permissions. Do the following as root on a local installation of mysql

```
takoda:~ kgomes$ mysql --user=root --password=
Enter password:
mysql> CREATE DATABASE esp;
mysql> CREATE USER 'espdba'@'localhost' IDENTIFIED BY 'leghorn';
mysql> GRANT ALL PRIVILEGES ON esp.* TO 'espdba'@'localhost' WITH GRANT OPTION;
mysql> quit
```
 - c. Launch the application either by command line with

```
java -jar esp-gui-0.2-SNAPSHOT-localhost-jar-with-dependencies.jar
```

or you should be able to double click on the jar in most cases.

Glossary

This page last changed on Dec 02, 2014 by [kgomes](#).

This page lists some terminology and their definitions and context as they were used in the design work of the GUI application. This is to ensure that when discussions are occurring, we are all talking about the same thing.

Term	Definition
<u>Sample Volume</u>	A volume of water that is drawn into the instrument that contains the organisms which the instrument is attempting to identify. The volume of water is never actually stored in the instrument, it is run directly through a puck and filter and then sent back out to the environment.
<u>Probe Array</u>	
<u>Filter</u>	Special paper that is used to filter out suspended material from a water sample. Sometimes the filter has probe arrays printed on it, but not always (for example, WCR has no probes as it just archives the organisms).
<u>GAL File</u>	File that is produced by the filter printer and contains the locations in X,Y coordinates and what probe arrays are at those X,Y coordinates.
<u>Puck</u>	Metal ring that holds filter paper which is used to capture and process organisms. There are three types of pucks: 1. Standard Volume Sample puck (SVS) 2. High Volume Sample puck (HVS) 3. Whole Cell Archive (WCR)
<u>Collection Stage</u>	The location where a puck is loaded during sample collection.
<u>Carousel</u>	Rotating set of tubes where pucks are stored.
<u>Manipulator</u>	The mechanism which is used to move pucks to the various locations in the ESP.
<u>Lysate</u>	A solution that is created by adding a solvent to the material that is filtered out of the sample water by the filter. This solution is then used as the source for analysis. Note the lysate can be split amongst many protocol runs (and other events).
<u>Protocol</u>	This is a sequence of steps that are taken to perform some biological analysis. This is sometimes called an Assay.
<u>Protocol Run</u>	This is the actual execution of a defined protocol.
<u>Phase</u>	Consists of a cycle of instrument power up, a sequence of one or more protocol runs, and a power down. Examples of phases are HAB, BAC, LARV, etc. The concept of a phase is important as a mission script is defined using phases. Phases

	can contain protocol run sequences that will take more than one sample of water. i.e. The relationship between phase and sample is one-to-many. Note also that the ESP normally goes into a low power, or quiescent, state.
<u>Initial Purge</u>	When a phase begins, the ESP powers up and initializes itself. If disinfectant solution was used in the previous phase, it will need to be purged by running a step called <u>Initial Purge</u> .
<u>Mission</u>	This is a logical span of time in which an ESP instrument is operating which has some start and end time. It is usually associated with a deployment and recovery of an ESP and consists of a sequence of phases separated by quiescent states.
<u>Deployment</u>	Is used synonymously with <u>Mission</u>
<u>Mission Script</u>	An ASCII file that contains Ruby commands that tell the ESP what actions to take at what times.
<u>SHA</u>	Acronym for Sandwich Hybridization Assay
<u>Standard Curve</u>	A curve that maps intensity to density of organisms. You use it to take the intensity of an image and calculate the density of organisms in the sample.
<u>Consumable</u>	Is any resource on the instrument that can be consumed. Examples are: 1. Power 2. Reagents 3. Capacities like waste (there are 2)

Phase (e.g. HAB, BAC, LARV, etc.)



GUI Related Proposals

This page last changed on Dec 02, 2014 by [kgomes](#).

For the ESP Development projects, the proposals that are related to the GUI application development can be found here:

1. [2007 project proposal](#)
2. [2008 project proposal](#)
3. [2009 project proposal](#)
4. [2010 project proposal](#)
5. [2011 project proposal](#)

Meeting with Chris, June 11, 2007

This page last changed on Dec 02, 2014 by [kgomes](#).

Minutes

1. Phases: HAB, BAC, LARV
2. Phases run protocols
3. Phase is a series of operations (could be one protocol, but more likely more). Can be one puck, but more likely more.
4. Phase is a standard set of operations
5. Each protocol needs a puck (with filter)
6. Filter may or may not have probes, whole cell has no probes, just brings home sample
7. All pucks have serial numbers.
8. pucks outer diameter is the same.
9. there are different pucks for different
10. SH = standard hybridization, detect molecules of interest. Heat it up and liquify. Filter and then apply to SH2. SH1 pucks can be used lysate.
11. Why do we want to keep track of serial numbers on pucks
12. Once puck is closed, not sure what is in there.
13. Serial numbers help keep track of what they intend to use it for after build.
14. Some have physical specimen and they need to figure out which puck has the specimen
15. After filtration, put on another filter, then more chemistry, then image.
16. Final PUCK is WCR (whole cell archival) is then sample is then preserved and brought home for shore side analysis
17. Associated with probes is spot map (array map) ".Gal File" (what probe in what X,Y location). Often listed as "Spot 23" then lookup with tell you X,Y
18. Image is analyzed and you get intensities.
19. Device can do "auto exposure" to figure out where it needs to be to get image in linear range of CCD chip.
20. Also ask for constant exposure (do more than one constant exposure).
21. Use standard curves and control spots on map.
22. Standard curve is number of bugs/intensity
23. Run exposure that you have standard curve for and then get intensity which then you lookup on the spot map.
24. Low res images come across the wire (high res is 1MB).
25. Phases can change the protocols (should we force users to use unique names- Chris thinks this would be good)
26. Array map evolves.
27. Protocols use same reagents, same amount
28. Phase-protocol combination (Phase tells you what the amounts are in the different protocols)

Attendees

1. Chris Scholin
2. Rich Schramm
3. Brian Schlining
4. Karen Salamy
5. Kevin Gomes

29. Volumes filtered varies (tell it "Collect a liter", instrument decides how much until to filter until clogged)
30. Print info comes from "gal file". Old print is excel file.
31. Some filters are thrown away, some are archived.
32. Comments also need to be captured.
33. Events are "when we sample"
34. User specifies start of phase
 - a. Then delay (7 minutes let's say), then sample is taken (that is the actual "start"). The rest of the protocols depend on the environmental characteristics.
35. There will be maximum time for each phase (can be shorter, never longer).
36. Instrument capacities:
 - a. Pucks:
 - b. Reagents: 20
 - c. Waste: fixed in current machine
37. Configuration file tells what reagents are at what valve.
38. There is a waste 1 and waste 2 (NOTE this is dependent on the reagent. specify which waste reagent goes to)
39. Power budget.
40. Instrument run
 - a. Take series of protocol, to build phases
 - b. write high level script
 - c. derive max volumes.
41. Number of pucks is usual limitation
42. sometimes waste can be limiter.

Mission Planning Script with Thresholding

This page last changed on Dec 02, 2014 by [kgomes](#).

Begin forwarded message:

From: Brent Roman <brent@mbari.org>

Date: March 10, 2011 8:30:02 PM PST

To: ESP Technical Deployment Discussion List <esptech@listserver.mbari.org>, "Zhang, Yanwu" <yzhang@mbari.org>

Subject: esptech ESP event triggers

I've checked code into CVS that allows mission phases to start on conditional event triggers (per today's demo).

I did add the ability to handle lists of "ored" conditions such that the conditional phase will start when any listed are met, however, I did not add "anded" condition lists because there is no clear definition of what the ESP should do if one of those conditions terminates with an error. For now, I'd like to propose that we leave this as is.

The example mission is checked into CVS as `esp2/mission/triggerTest.rb`. It does now synchronize with the CTD polling thread using like this:

```
:HotWater.denotes proc {  
  loop {  
    SensorPolling.awaitUpdate  
    break if CTD.temperature >= 25  
  }  
}
```

Chris P. and I met to discuss how to handle the case where a WCR must be processed on an event that occurs while the MFB grinds in the background. The current code indeed cannot handle this, as the ESP will not advance to the next phase conditional until the MFB is done. I intend to remove this restriction in the coming days.

Note that this does not yet include Yanwu's peak detection logic, but is a framework for adding arbitrary conditions to start individual ESP phases. I'll work with Yanwu next week on converting his Matlab code to ESP event triggers.

-

Brent Roman
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MBARI
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Here is the script for MOE that the GUI should be able to generate (although Chris said this is not the final form):

```
#Mission: MOE March 2011 M0 Canon  
#Nitrate and Temperature can Trigger sampling  
  
module Threshold  
  module_function  
  def highNO3= highNO3um  
  @highNO3 = highNO3um  
  log "HighNitrate threshold set to #{highNO3um}uM"  
  end  
  def highNO3  
  @highNO3  
  end  
  
  def lowNO3= lowNO3um  
  @lowNO3 = lowNO3um  
  log "LowNitrate threshold set to #{lowNO3um}uM"  
  end  
  def lowNO3  
  @lowNO3  
  end
```

```

def hotWater= tempC
@hotWater = tempC
log "HotWater threshold set to #{tempC}C"
end
def hotWater
@hotWater
end

def coldWater= tempC
@coldWater = tempC
log "ColdWater threshold set to #{tempC}C"
end
def coldWater
@coldWater
end

def wcrDelay= time
@wcrDelay= Delay.new time
log "WCR will wait up to #{wcrDelay} for conditional triggering"
end
def wcrDelay
@wcrDelay
end
end

# initial thresholds
Threshold.highNO3=45
Threshold.lowNO3=5
Threshold.hotWater=25
Threshold.coldWater=2
Threshold.wcrDelay="6:00:00" #6 hours

:HighNitrate.denotes proc {ISUS.no3 > Threshold.highNO3} #uM/L
:LowNitrate.denotes proc {ISUS.no3 < Threshold.lowNO3} #uM/L

:HotWater.denotes proc {CTD.temperature > Threshold.hotWater} #C
:ColdWater.denotes proc {CTD.temperature < Threshold.coldWater} #C

:LowNitrateAndHotWater.denotes proc {LowNitrate[] and HotWater[]}
:HighNitrateAndColdWater.denotes proc {HighNitrate[] and ColdWater[]}
:HighNitrateAndHotWater.denotes proc {HighNitrate[] and HotWater[]}

#standard, repeated mission phase
def pcrWCR(*wcrConditions)
bacSHAMfb
awaitEventUntil Thread.time+Threshold.wcrDelay, *wcrConditions
standAloneWCR ([nil, 1000], $bac) {hotBleach :waste2b}
Sleep.awaitBackgroundThreads {
Log.record "Extending phase until #{Sleep.backgroundNames} finish(es)"
}
end

#$startTime = nil #don't override start time of initial phase

mission :startTube=>2, :until=>"6AM 5/2/11" do

at "1PM 3/31/11" do
pcrWCR
end

at "9AM 4/3/11", or: HighNitrate do

```

pcrWCR ColdWater
end

end

Outstanding Questions

This page last changed on Dec 02, 2014 by [kgomes](#).

1. Do we need to track the serial numbers of the pucks in the application?
2. If we print barcodes on filters, do we want to track in the application?
3. Does the delay (7 minutes) only happen at the beginning of each phase or each protocol?
4. Is max duration at the phase level or protocol level?
5. What sort of things go in Event_Types? I think we are using those for mostly stuff that gets parsed out of the log file and stuffed into events, but should we have Protocol_Run, Phases, or Deployments in the event types even though they are actually subclasses?
6. I think the Eventt hierarchy should look like Deployment->Phases->Protocol_Runs. Just want to verify.

Project Memos Minutes

This page last changed on Dec 02, 2014 by [kgomes](#).

PDR Meeting Notes (June 6, 2007)

No Notes Recorded	
	Attendees
	1. Rich Schramm 2. Kevin Gomes 3. Chris Scholin 4. Doug Pargett 5. Scott McLean 6. Jim Birch
	Documents
	1. [Powerpoint Slides (ppt)] ESPAPP:ProjectPresentations^PDR.ppt Power Point Slides PDR] 2. Demo Mockup 3. [WBS and Costs (xls)] ESPAPP:ProjectPresentations^PDR.xls WBS Spreadsheet]

Requirements (and Gathering) Documentation

This page last changed on Dec 02, 2014 by [kgomes](#).

In order to gather the requirements for the Graphical User Interface, the GUI team met with the ESP science and engineering members to try to determine what the GUI needs to do. We also poured over relevant documentation to try to extract as much knowledge as we could about the system before defining the requirements (see below). The following requirements were gathered as part of that process.

Requirements

Number	Requirement	Goal
	User can define missions by specifying phases	Planning
	User can specify and adjust phase start times	Planning
	User can also specify a time to wait between events instead of a specific start time	Planning
	User can set mission start and end times that are not associated with a phase/protocol	Planning
	User can specify comments associated with missions that are printed at the top of the mission script	Planning
	After planning, application should generate mission script, puck loads, and reagent volumes	Planning
	User can add comments to a phase that will be generated in the script	Planning
	Users can add/delete/edit protocol runs and phases	Planning
	Users can load missions from existing ruby scripts	Planning
	Users can specify thresholding events in plans (example)	Planning
	Users can copy existing phase and protocol to create duplicate	Planning
	Users can add/delete/edit consumables	Planning
	Users can schedule Kills (end purges) or disable kills	Planning
	Users can define generic events and what script will actually be	Planning

	added to the master script (if needed)	
	Mission plan generation will include a puck loading list	Planning
	User can associate external files with events (excel spreadsheet, documents, etc.)	Planning, Data Management
	Tide and phase information will be available	Planning, Data Management
	Application will list sample volumes with protocol run	Planning, Data Management
	User can add non-phase/protocol events (user defined) to the calendar anywhere	Data Management
	User can view images associated with phases	Data Management
	User can browse the .GAL file along with image and filter paper information	Data Management
	User can browse image, click on intensity and application applies .GAL/Map with standard curves to give density	Data Management
	User can browse the low-res images that come over the telemetry until full size image is offloaded after recovery	Data Management
	When users selects a protocol run/phase, the contextual data (CTD/ISUS) should be shown	Data Management
	Application should allow for details of flushes to be seen/ accounted for	Data Management
	The application should archive (and make available) the environment variables for each deployment and make available to user. These variables are: 1. <i>ESPhome</i>: Is the directory on the linux host which is the top level (root) of the directory of ESP source code tree 2. <i>ESPname</i>: is the name of the ESP machine 3. <i>ESPmode</i>: is the operating mode in which to run the ESP software 4. <i>ESPlog</i>: is the root directory on the linux host	Data Management

	under which all data files are written. 5. <i>ESPpath</i>: is a list of directories on the linux host to search for mission scripts. 6. <i>ESPconfigPath</i>: is a list of directories to search for configuration files. The path will include the ESPTYPE which is either shallow, mfb, 1km, or 4km. 7. <i>RUBYLIB</i>: is a list of directories to search for the "required" Ruby libraries and scripts	
	Users should be able to download instrument logs and images and the GUI will parse out the following events: • Track deployments of contextual sensors (sub-deployments of ESP) • Collection of contextual sensor data (with capability to view/work with data) • Phase Start Time • Start Time of Initial Purge (what version if there is one) • End Time of Initial Purge (what version if there is one) • Start Time of SH1 (Protocol for sample collection/ homogenization) • Start Time of Actual Sample Collection for SH1 • End Time of Sample Collection for SH1 • Volume of Sample Collected • End Time of SH1 • Start Time of SH2 Protocol (Generally preceeds end of SH1) • Start Time of WCR (Generally preceeds end of SH2) • Start Time of Actual Sample for WCR • End Time of Sample Collection for WCR • Array Images (Generally >1 and >1 resolution/ binning, exposure times) • End of SH2 • End of WCR • Start Time of final purge (what version, if there is one)	Data Management, State Visualization

	• End Time of final purge (what version, if there is one) • Phase End Time	
	Application will track status of consumables: 1. Pucks 2. Reagents: 20 or so 3. Waste 4. Power	State Visualization
	Users can visualize the current state of the instrument	State Visualization
	Users can scroll back in time and visualize instrument state at the various points in time	State Visualization

Web Application Development

This page last changed on Jun 27, 2012 by [kgomes](#).

The goal of this work is to take the work done on the Java thick client GUI and make that same functionality available through a web application.

Ruby on Rails

My first thought was that maybe I could point Ruby on Rails to the database that is being used by the GUI. That would provide a nice integration with the Ruby that I would need to parse the log file and the database that contains all the information. I tried doing this on the Mac, but had a heck of a time trying to get the Ruby on Rails to integrate with PostgreSQL. Since we seem to be moving to PostgreSQL, I thought I would start to focus on this for the web application. So, starting with a clean CentOS 6.2 VM, here are the steps I took:

- 1.

Web GUI Design

This page last changed on Sep 20, 2012 by [kgomes](#).

Back to basics ...

1. What does the ESP do?
 - a. Collects discrete water samples
 - b. Concentrates microorganisms or particles
 - c. Automates application of molecular probes which identify microorganisms and their gene products
 - d. Archives samples for later analysis

3G Cartridge-puck Numbering System

This page last changed on Apr 11, 2019 by [jbirch](#).

Cartridge part numbering

Numbering convention of cartridges from May, 2018 is [here](#).

4k ESP Calendar (Sept09)

This page last changed on Sep 14, 2009 by [pargett](#).

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9/6	9/7	9/8: Gordon into Sphere Install PT's	9/9 Test PT's	9/10 Cool down	9/11: OFF FRIDAY	9/12: OPEN HOUSE
9/13	9/14 Fix leaks Fix manip Test full sampling loop Cool down in evening Run mission overnight.	9/15 Install Bells, Jacket Bolts Attach High Pressure Int. (1300 psi)	9/16 High Pressure Testing	9/17 High Pressure Testing	9/18 High Pressure Testing	9/19
9/20 Warm up overnight	9/21: Load new Reagents/ pucks Elevator to HighBay Can Sphere, He purge, test, N2 purge Attach ISUS Replace battery on CTD Post Can QC	9/22 Attach elevator bumpers Cable spool mounts, Cable spool	9/23 TEST TANK Move elevator to test tank Get weights Set to bottom with snorkel tube	9/24 RUN BAC	9/25: OFF FRIDAY	9/26
9/27	9/28 Remove from test tank Vacuum out waste via port Charge batteries Run Core Neg.	9/29: MOB	9/30: Deploy on MARS			

AccelBiotech Slides

This page last changed on Jun 17, 2013 by [pargett](#).

Betty

This page last changed on Feb 04, 2010 by [sjensen](#).

Software Revision level for Instrument Betty

OS

Ruby

Protocol

Firmware

Cartridge testing

This page last changed on Nov 19, 2013 by [jbirch](#).

Materials for Accel cartridge testing

1. [Cartridge assembly document from Accel](#)
2. [BOM for Cartridge \(v1\), puck, and holders](#)
3. [Valve Movements Necessary](#)

Test Plan v1 (Sep 13, 2013)

Must label ports/paths on cartridges

Convention for syringes (with spool valve on left) will be:

0	1	2	3	4
Spool valve	check valve	check valve		
	spring	spring		
	air	RNALater	waste	waste

Filtration Speed and Evac

--22 PSI thru puck within CARTRIDGE within Accel Test Holder
within G2 holder using raw seawater, with x3 replica's

Syringe Functions

--How to load syringes
--check valves; do they leak or hold pressure?
--After Final Assembly Testing by hand:
--define actuation process
--build bench testing actuator

Full Assembly sub-test (all testing will have companion G2 comparison test)

--filter
--move spool valve
--evac w/ push
--remove puck and weigh

When procedure refined, run w/ 0.45 filter and filter 'stacks'

Final Assembly Test (all testing will have companion G2 comparison test)

--filter
--move spool valve
--evac w/ push

--hit with RNALater

--remove and process filter [BOM MBARI 2013-09-17 ARCHIVE CARTRIDGE.pdf](#)

Cheat Sheet

This page last changed on Sep 17, 2008 by [maro](#).

Draft ESP cheatsheet as of 3/21/07

This will likely need to be put into a Word document.
Feedback appreciated...

Avoiding a position on a rotary valve example-----> PTV.to :puck, :avoiding=>:PRV

Preparation for running high level protocols in the lab:

0) Insure that no one else has is running the esp application on the ESPhost machine

1) ssh to the ESPhost machine as the appropriate user
(most often this will be user esp or scholin)

\$ ssh user@espHost

2) confirm the ESP is getting the right code base
check the Using ... line that appears right after the login
It should say
Using esp@espbook, ESPhome=/home/esp/esp2 for user scholin
or
Using esp2local, ESPhome=/home/esp/esp2 for user esp

The message:

WARNING: ESPhome is undefined!

indicates a transient network filesystem problem (NFS).
If the machine is in a safe state, simply logout, cycle its power and try again after 30 seconds or so. Alternatively, you can login as the root use and type:

service nfsmount start

After the nfsmounts all complete, logout of root and try logging in as scholin again. You should not see this problem when logging in as user esp, as this user does not rely on NFS mounts.

3) start the esp application

\$ esp

4) Insure that the ESP is homed and ready:

esp> ESP.ready!

5) Visually verify that the FlushPuck is in its garage.

Now, after loading the appropriate puck(s),
you will be ready to run your protocols as follows:

[Whole Cell Archive]

wcr sampleVolume, bubblePt, fixTime=60*60, fixes=3, fixVolume=2

Example:

esp> startTube 3 #pull WCR puck from tube 3, discard into tube 2

esp> wcr 200, 24 #sample 200ml, filter bubblePoint of 24psi

#defaults to 3 (20 minute) fixes of 2ml each.

[Short Sandwich Hybridization phase 2 for in lab testing]

shortSh2(signal=:sig1, hash={}, &wcrBlock)

Examples:

```
esp> startTube 2    #pull pucks from tube 2, discard into tube 1
esp> shortSh2 :sig2, :assay=>:bac #run BAC assay using :sig2

esp> shortSh2(:sig1, :assay=>:hab)
```

Unknown macro: {wcr 50, 24}

#hab assay followed by wcr

[Harmful Algae Bloom]

```
HAB(sampleVolume=400, wcrVol=50, &cleanup) #with initialPurge
hab(sampleVolume=400, wcrVol=50, &cleanup) #w/o initialPurge
```

Examples:

```
startTube 7    #pull 4 pucks from tube 7, discard into 6
esp> HAB    #sample 400ml, wcr 50ml, standard killIntake cleanup
esp> HAB 1200, 100    #1200ml sample, 100ml wcr
esp> hab(1000)
```

Unknown macro: {endPurge}

#1000ml sample
#skip initialPurge, do not purge or kill Intake

[Larval]

```
LARV(sampleVolume=400, wcrVol=50, &cleanup) #with initialPurge
larv(sampleVolume=400, wcrVol=50, &cleanup) #skip initialPurge
```

Examples:

```
esp> startTube 7    #pull 4 pucks from tube 7, discard into 6
esp> LARV    #sample 400ml, wcr 50ml, standard killIntake cleanup
esp> LARV 1200, 400    #1200ml sample, 400ml wcr
esp> larv(1000)
```

#1000ml sample
#skip initialPurge, do not purge or kill Intake

[Bacterial]

```
BAC(sampleVolume=100, wcrVol=50, &cleanup) #with initialPurge
bac(sampleVolume=100, &cleanup) #without initialPurge
```

Examples:

```
esp> startTube 5    #pull 4 pucks from tube 5, discard into 4
esp> BAC    #sample 100ml, wcr 50ml, standard killIntake cleanup
esp> HAB 1700, 800    #1700ml sample, 800ml wcr
esp> bac(1500, 500)
```

Unknown macro: {endPurge}

#1500ml sample, 500ml wcr
#skip initialPurge, do not purge or kill Intake

[Demoic Acid]

```
DA(sampleVolume=750, &cleanup) #with initialPurge
da(sampleVolume=750, &cleanup) #without initialPurge
```

Examples:

```
esp> startTube 6    #pull 3 pucks from tube 6, discard into 4
esp> DA    #sample 100ml, NO WCR, standard killIntake cleanup
esp> DA 1200    #1200ml sample, no wcr
esp> da(1250)
```

Unknown macro: {|ports| endPurge(*ports)}

#1250ml sample, no wcr
#skip initialPurge, do not purge or kill Intake

```
[Harmful Algae Bloom plus Demoic Acid]
  HABDA(sampleVolume=400,daVolume=750,&cleanup) #w/initialPurge
  HABDA(sampleVolume=400,daVolume=750,&cleanup) #w/o initialPurge
```

Examples:

```
esp> startTube 4    #pull 7 pucks from tube 4, discard into 3
esp> HABDA    #sample 400ml, wcr 50ml, DA 750ml, standard cleanup
esp> HABDA 500, 300    #sample 500ml, DA 300ml, standard cleanup
esp> habda(1200, 500)
```

```
)}
      #1200ml sample, 500ml DA, (50ml wcr)
      #skip initialPurge, do not purge or kill Intake
```

=====

Image Capture

All the above protocols (except wcr) take additional (optional)
:key=>:value type parameters that can be used to alter the image
capture settings. By default, three images are taken.

Image #1: 10 seconds with 4x4 binning

Image #2: 30 seconds with 4x4 binning

Image #3: hi-resolution Auto exposure

The :image key can be used to override this for a
given protocol run as follows:

```
esp> HAB 500, 50, :image=>[5, : hires, 40, :auto, :midres, 20]
```

This takes the following images:

Image #1: 5 seconds with default (4x4) binning

Image #2: 40 seconds with no binning (hi-resolution)

Image #3: hi-resolution Auto exposure

Image #4: 20 seoncds with 2x2 binning

See the Exposures, ImageMode and PuckCamera declarations in
shallow/configure.rb for more details on setting default
binning, image output directory, etc.

=====

Gigi's puck handling comands have undergone quite a bit of revision
over that past couple months.

Here's an updated command reference:

Puck Handling commands

[This is copied from a mail I originally sent the list on 1/18/07]

```
CC.loadPuck label, fromTube=nil
PC.loadPuck label, fromTube=nil
# load a puck from the specified carousel tube into
# the respective clamp (CC or PC). Use the required
# puck label help to track it. Typical labels are:
# :sh1, :sh2, :lyfil, :WCR, etc. The labels will soon enable
# the ESP to produce instructions for loading
# the carousel prior to a mission. For now, they
# just show up as helpful comments in the log.
# If the fromTube is not specified, then the puck
# is taken from the currently defined "startTube"
# If that "startTube" is empty, it advances
# "startTube" to the next tube automatically.
# This lets puck sets span tubes if desired.
```

```
CC.unloadPuck toTube=Storage.dstTube
PC.unloadPuck toTube=Storage.dstTube
# unload puck in specified clamp to specified carousel tube.
```

```
# If toTube is not specified, the puck is stored
# in the "destination tube". For now, the "destination tube"
# is simply one less than the current startTube.
# For this reason, is it not advisable to set startTube to 1.
```

```
startTube tubeNumber=nil
# define the current start or sourceTube for loadPuck.
# if tubeNumber is omitted, the current startTube
# is returned, unchanged.
```

```
dstTube
# returns the current default destination tube for
# unloadPuck. There is no way to set this explicitly.
# For now, it is defined as 1 less than startTube.
```

```
access tubeNumber=SC.position.base
# Rotate the carousel such that the specified tube
# is accessible for manually loading and unloading pucks.
# if tubeNumber is omitted, the currently selected
# tube is made accessible.
```

```
CC.contains
PC.contains
# return the label of the puck currently clamped
# Handy if you've forgotten what's where...
```

```
Flush.to CC
Flush.to PC
CC.loadFlush
PC.loadFlush
# all these simply load the flush puck into the specified clamp
```

```
Flush.garage clampedPos=nil
# put the flush puck back into its garage
# The clamp need not normally be specified, as the system
# will track where the FlushPuck is currently clamped.
# It may be specified to explicitly override the system's
# record of the current FlushPucks position.
```

```
PC.unloadFlush
CC.unloadFlush
# equivalent to
# Flush.garage PC or Flush.garage CC
```

```
Puck.move fromTube, toTube
# move the tube at the top of tube fromTube
# to the top of top toTube
```

```
Puck.count tubes=1..Sctubes
# count the number of pucks in the specified tubes
# of tubes is omitted, count the # of pucks in all tubes.
# This works by measuring the height of each respective
# puck stack.
```

```
Storage.pucks
# returns a hash of tube numbers to their respective
# puck stack heights. The unit of measure such that
# 1.0 = one standard puck. The results are fractional
# due to measurement errors and puck height variances.
```

```
Storage.pucks.sort.collect
```

```
Unknown macro: {|x| x.last ? x.last.round }
```

```
# This incantation will return an array with each element
# corresponding to the number of pucks in that tube.
```

=====

Multithreading has introduced the concept of locking the Arm and the FlushPuck to a particular thread to ensure that no other thread can hijack those resources while that are in use. The FlushPuck and Puck load/unload commands handle this locking more or less transparently. The Arm is locked for as long as it takes to complete the requested puck move. The FlushPuck is locked whenever it is not garaged.

If a script attempts to move a puck while the Arm is locked, you will see the message:

```
Waiting for (threadName) to free Arm
==or==
Waiting for (threadName) to free FlushPuck
```

Normally, the thread will eventually free the resource, allowing the waiting thread to continue after claiming it. However, The system can become confused if a puck movement is interrupted either by an error or user abort. In this case, the thread that locked the Arm and/or FlushPuck may be dead and the system in an indeterminate state. The commands:

```
Arm.reset
FlushPuck.reset
```

May be used to in this case to reset the locks so that new threads may access the resources. Normally, these command would be executed only after the ESP was carefully inspected and returned to a safe state using low level Arm.commands. For instance, if a user aborted loading a FlushPuck into CC, the recovery sequence might be:

```
CC.open
Arm.releaseAt :garage
Arm.reset
FlushPuck.reset
```

Note that, if another thread is waiting on the resource, it will be able to acquire it and continue after Arm/FlushPuck .reset. Therefore, it is important not to reset until the system is put back into a "safe" state. Also note that the primitive Arm.commands do not respect the state of any locks, whereas the FlushPuck and other higher-level puck movement commands do. This rule allows users to interactively move the Arm to clear errors without first resetting the locks.

And, a quicky new Arm command:

```
Arm.withdraw
#retract the arm without opening the hand.
```

Container Storage Locker Information (10-1-2008)

This page last changed on Sep 01, 2011 by [jbirch](#).



Who we purchased the D-ESP van from:

American Portable Storage

Purchased Feb, 2009
Oakland, CA
1-800-838-4006; (Ken)

Purchased 20' van, 220V Single Phase with 3hp refrigeration system, good from -10 to 55F.
SS sides, aluminum floor.

Michael McCurley--his quote is [here](#).

Pictures of how to hook-up electrical are [here](#). Here is the [junction box](#). Here is how to [start the unit](#).

PDF files of the van specifications and structural drawings are in the "STORAGE VAN MATERIAL" [folder](#). (this is still under construction, but it's in the project library)



Who we purchased the Reefer Shipping Van from:

Cold Box (I believe this was a spin-off of APS above)

Purchased 20' reefer van July, 2011
Oakland, CA
1-800-595-0601; (Mario Leon)

Quote is [here](#)

PO is [here](#)

Internal dimensions: 86" high, 89.5" wide, 212" long

CVS For McLane

This page last changed on Mar 09, 2010 by [kgomes](#).

In order for McLane to get access to the source code for the ESP, it was deemed that a CVS server in the DMZ with the source code rsync'd out was probably the best option. The machine prey.mbari.org was deemed as the best fit. In order to configure prey for this work, the following steps were taken:

1. Logged in a root
2. ran up2date cvs to install the cvs and received the following:

```
[root@prey home]# up2date cvs

Fetching Obsoletes list for channel: rhel-ia64-es-4...

Fetching rpm headers...
#####

Name                               Version                Rel                Arch
-----
cvs                                1.11.17                11.el4              ia64

Testing package set / solving RPM inter-dependencies...
#####
cvs-1.11.17-11.el4.ia64.rpm ##### Done.
Preparing                        ##### [100%]

Installing...
1:cvs                            ##### [100%]
[root@prey home]#
```

3. Created the home directory for cvs

```
[root@prey home]# mkdir /home/cvs
```

4. I initialized the cvs home directory using

```
[root@prey cvs]# cvs -d /home/cvs init
```

This created the CVSR00T directory and populated it with the necessary files.

5. I then created the two cvs related groups using

```
[root@prey cvs]# groupadd cvsusers
[root@prey cvs]# groupadd cvsadmin
```

6. Created a cvs user (and group) using:

```
[root@prey cvs]# groupadd cvs
[root@prey cvs]# useradd cvs -g cvs
```

7. Added the CVSR00T environment variable by adding the following to /etc/profile

```
# Export the CVSR00T directory
CVSR00T=/home/cvs
```

```
export CVSR00T
```

8. I set the cvs executable permissions so that it can be run as a service

```
[root@prey bin]# chmod 2755 /usr/bin/cvs
```

9. Finally, I created the file /etc/xinetd.d/cvs and put the following in that file:

```
service cvspserver
{
    disable          = no
    socket_type      = stream
    wait             = no
    user             = cvs
    group            = cvs
    log_type         = FILE /var/log/cvspserver
    protocol         = tcp
    env              = '$HOME=/home/cvs'
```

```
bind                = 134.89.2.27
log_on_failure      += USERID
port                = 2401
server              = /usr/bin/cvs
server_args         = -f --allow-root=/home/cvs pserver
}
```

10. I then rebooted prey

Deep ESP

This page last changed on Oct 19, 2011 by [jbirch](#).

1. [4K Sphere](#)

IEMI number for Sable 5000:

300034012099780

The Sable is the emergency locator beacon that starts transmitting GPS coordinates once instrument package surfaces.

1. [Sable 5000 Iridium Beacon Manual v. 2.0](#)
2. [Sable 5000 Iridium Beacon Manual v. 2.1](#)

4K Sphere

This page last changed on Feb 14, 2011 by [kgomes](#).

Quotes

- Sphere casting ([Wah Chang](#)) [1st piece arrived May 7, 2008]
- Machining
 - [Tapemation](#)
 - Hanard Machine (sent for quote 11-15-07 --> [negative response](#))
 - Sphere pictures are located in [[http://mwww.mbari.org/ProjectLibrary/ESP/DWSM/4K DWSM/4k Sphere Pictures](http://mwww.mbari.org/ProjectLibrary/ESP/DWSM/4K_DWSM/4k_Sphere_Pictures)]

negative response

This page last changed on Dec 28, 2007 by [jbirch](#).

Subject: Machining 4k sphere
Date: Wed, 5 Dec 2007 08:25:41 -0800
Thread-Topic: Machining 4k sphere
Thread-Index: Acg3W3pDdPq8Hs8jRtKanjDmUGXOrA==
From: "Brown, Mark" <mob@mbari.org>
To: "Birch, James" <jbirch@mbari.org>,
"Scholin, Chris" <scholin@mbari.org>

Jim & Chris-

Just to keep you up to date-

For machining the large 4k sphere's we have one quote from our local vendor (Tapemation) that came in approx. \$40,000. **We had another vendor in Oregon just get back to us with a "no quote" and they said this was outside of their comfort zone.**

I have a call into our casting vendor Wah Chang asking about who they might have dealt with for a large casting such as this and I will let you know what I find out.

-Mark

Mark Brown

Support Engineering Group Leader

MBARI: <<http://www.mbari.org>>www.mbari.org

ph: 831 775 1939

fx: 831 775 1615

Detection Technologies

This page last changed on Feb 15, 2011 by [jbirch](#).

1. [Isotachophoresis](#)
2. List of filter manufacturers provided by Graham Marshall while at ALA (Jan, 2011)

http://www.idswater.com/water/us/spintek_filtration/ceramic_membrane/290_0/g_supplier_2.html

<http://www.spintek.com/index.htm>

<http://www.refractron.com/filtration.asp>

<http://www.veoliawaterst.com/ceramem/en/>

[http://www.sciencedirect.com/science?](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TGK-4S73RD8-3&_user=10&_coverDate=07%2F15%2F2008&_rdoc=1&_fmt=high&_orig=se)

[_ob=ArticleURL&_udi=B6TGK-4S73RD8-3&_user=10&_coverDate=07%2F15%2F2008&_rdoc=1&_fmt=high&_orig=se](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TGK-4S73RD8-3&_user=10&_coverDate=07%2F15%2F2008&_rdoc=1&_fmt=high&_orig=se)

http://www.ibmem.com/international/ceramic_membranes.htm

http://books.google.com/books?id=LpiuJVxJS_AC&pg=PA189&lpg=PA189&dq=ceramic+tubular

[+microfiltration&source=bl&ots=l2Dz6HXD66&sig=l094bOyDr3lIGWvvh4twe404HHY&hl=en&ei=MFpLTYv7Iou0sAOzl6H](http://books.google.com/books?id=LpiuJVxJS_AC&pg=PA189&lpg=PA189&dq=ceramic+tubular)

[%20tubular%20microfiltration&f=false](http://books.google.com/books?id=LpiuJVxJS_AC&pg=PA189&lpg=PA189&dq=ceramic+tubular)

Isotachophoresis

This page last changed on Jan 29, 2010 by [sjensen](#).

Copied from Email from Brent on 28 January 2010:

At LabAutomation 2010,
Juan Santiago of Stanford presented a talk called:
Rapid Chemical Detection and Identification with a Hand Held Device
Tuesday at 3:30 in the Evolving Apps of Lab Automation Track

The device was indeed small and powered by a USB port (<2.5 watts)

It detected pathogens in (aqueous) environmental samples via isotachophoresis.

<http://en.wikipedia.org/wiki/Isotachophoresis>

Those molecules whose isotachophoresis separations would be similar could be uniquely identified by their characteristic pKa values by repeating the short (15 second or so) assay in buffers of differing pHs.

I thought the device might make a great "nose" for our ESP 3.

<http://microfluidics.stanford.edu/>
<http://microfluidics.stanford.edu/Publications/Publications.html>
<http://microfluidics.stanford.edu/Publications/ElectrokineticFlows/schoch%20et%20al%20LoC%20extraction%20of%20RNA%20from%20lysate%202009.pdf>

Is this worth pursuing further?

Development Leads

This page last changed on Sep 07, 2010 by [jbirch](#).

Chris found this valve ...

<http://www.parker.com/literature/Literature%20Files/Precision%20Fluidics%20Division/UpdatedFiles/PACE%20Data%20Sheet.pdf>

These valves used by Kia Peyvan of Custom Array:

(from 9-7-2010 email)

BTW, Jim the company with the tiny valves is called Takasago. I use their KV series (<http://www.takasago-elec.co.jp/cgi-bin/en/index03.html>) . If you have a very small space you operation in they are good. But burkert valves are still the top of the line in my opinion.

DWSM--4k Deep Water Sampling Module

This page last changed on Sep 08, 2009 by [jbirch](#).

1. [Comments from July 9, 2008 Design Review](#)
2. [Doug's collected comments of 9 july CDR](#)
 - [The DWSM scheme](#) (in particular see slide #3)

New temp insensitive Pressure Transducers arrived 04Sep2009. Testing and installation into D-ESP proceeding for Sep 30 MARS deployment.

Comments from July 9, 2008 Design Review

This page last changed on Jul 10, 2008 by [jbirch](#).

DWSM electrical/software CDR
July 9, 2008

Present: Wayne, Paul, Tom M., Brent, Doug, Scott, Jim B., Chris S.

Comments/questions by audience recorded by Jim B:

- Fuses in power supply lines
- Fan inside ball when power supplies on to help with thermal management. Buy fans that indicate whether they're spinning -or- Build bigger heat sink and bypass the fan idea.
- Indicator lights for trouble-shooting
- Change connectors to FCR in drawings
- What is input voltage and power supply output voltage? Should you measure output voltage and current?
- Paul's comment on adding nuisance trips
- Hall sensor on brushless high pressure pump motor
- Pressure sensor, can they go to 6000psi?
- Paul, we have the information, but should continue think about failure modes and how will the system protect itself. Like tune motors to torque limit just over getting the job done, in order to tell if job isn't finished.
- Paul mentioned current draw from MARS. Would 20m away cause too much of current drop for Vicor boards to start complaining? Thought is that no, will probably not be a problem.
- Are there cables and connectors to connect to MARS?

Doug's collected comments of 9 july CDR

This page last changed on Jul 11, 2008 by [sjensen](#).

Add seawater sensors at bottom of each oil chamber

Sample tube in bag to $\frac{3}{4}$ depth

Upper/lower purge may need to wait until, or be moved to after sampling.

May need to add an RO water rinse fluid. (non-toxicant) Verify that air compliance is at right volume.

Also look at cast 17-4 for bell housings.

brent: One could use a serial port or ethernet for communications to the ESP

brent: Core must be work from 2C to 35C

gene: Test urathane bags for oil compatibility

gene: Pack toxicant bag in PVC or similar hard container

gene: Don't servo on pressure, just monitor it during decompression

brent: measure amplitude of sample pump's pressure impulses

brent: Modify ESP scripts to purge into DWSM before starting sample processing

gene: Add an external bag for DI Water to mix with toxicant

brent: Add filter on raw water inhaled into bags when rinsing them

brent: Measure compliance when filling bells with oil

jon, gene, et al.: Invert bells when filling with oil

gene: Dish out top plate to control air bubble size

gene: consider stainless for casting bell housings

jon: 3 threads on HP oil pump motor housing is bare minimum

gene: O-ring on HP oil pump motor housing may be damaged on assembly

mike: put O-ring on inside wall to prevent this

Need fuses on power

- Yes I do need to add then and I will

Need to add fan for 600W

- See last comment in this paragraph

Consider indicator lights

- I will consider

Monitor input and output voltages

- I need to investigate how to do this within the current hardware

May need to mointor fan operation

- consider this

Also, size internal heat fins to hold heat of 1 decomp.

Pressure switches, use NC instead of NO since most tend to fail open as opposed to fail closed.

- good suggestion, CPLD allows for this change in logic state

Not much margin over 4000m on PT's, check the % over reading capacity.

- While we may not be able to read to the actual full depth ocean pressure this is not a big concern as we are mainly concerned that

we have decompressed to a save level. Since we use a compensation chamber we do not pump to pressure.

Plan to test fault conditions

DWSM fluid Diagram

This page last changed on May 28, 2009 by [jbirch](#).

EM cables

This page last changed on Jan 04, 2017 by [jbirch](#).

(as of April, 2015)

Surface Mooring Cables

35.5m (w/ floats) (DESTROYED)

- 35 days S. Cal ECOHAB w/ Bruce (Mar 2013)
- 32 days S. Cal ECOHAB w/Bruce (Apr 2014).
- del mar 6 month (summer 2016)

25.5m

25.3m

- 24 days as Catalina Island replacement (April 2014). Installed April 8, recovered May 1.

21.5m (BAD)

Now with bad connector...

- Catalina Island (April 2014). Deployed March 18. Failed after 4 days. Used for total of 21 days. Leakage into bottom bell, which corroded power pin. 'Popped' when we opened it. Photos in the attachments of this page.
- late-2014; was this EM cable repaired?

15.6m

- 35 days S. Cal ECOHAB w/Mack (Mar 2013)
- 41 days MB ECOHAB w/Mack (Sep 2013)
- 32 days S. Cal ECOHAB w/Mack (Apr 2014)
- Moran deployment (Sept/Oct 2016)

15.2m (BAD; bad BSR?)

- 41 day MB ECOHAB w/Bruce (Sep 2013)

Drifter Cables

28.5m (bare)

22.0m (w/ floats; pins #2 and #5 bad)

8.0m (w/ floats)

All cables have lengths etched into the upper cone (the one that attaches to the buoy).

Usage stats will be added as we use them.

Shackle Usages (started keeping track in 2014)

[shackle and line lengths](#)

All shackles modified Dec 2015 to be like 001 (stretchier cords)

ESP-001 (modified with 'stretchier' cord)

- 44 days during Catalina (April 2014) deployment
- Moran MB deployment (Sep/Oct 2014)
- ECOHAB?
- Del Mar (start May 17, 2016)

ESP-002

- Moran (sep/oct 2016)

ESP-003**ESP-004****ESP-005**

Anchor lines

11m

- 32 days S. Cal ECOHAB w/Mack (Apr 2014)
- 41 days MB ECOHAB w/Mack (Sep 2013)
- 35 days S. Cal ECOHAB w/Mack (Mar 2013)

21m

- 35 days S. Cal ECOHAB (Mar 2013)

23.4m

- 32 days S. Cal ECOHAB w/Bruce (Apr 2014).

45m

- 41 days MB ECOHAB (Sep 2013)

57M

- 2014 Moran deployment in MB
- moran (sep/oct 2016)

159m

- 44 days during Catalina (April 2014) deployment

Engineering Timeline

This page last changed on Mar 27, 2008 by [jbirch](#).

1. [2008 Q1-Q2 Schedule \(rev 1\)](#)
 2. [2008 Q1-Q2 Schedule \(rev 2\)](#)
 3. [2008 Q1-Q2 Schedule \(rev 3\)](#)
 4. [2008 Q1-Q2 Schedule \(rev 4\)](#)
 5. [2008 Q1-Q2 Schedule \(rev 5\)](#)
 6. [2008 Q1-Q2 Schedule \(rev 6\)](#)
-
1. [Machinist build schedule \(Feb 2008\)](#)

2008 Q1-Q2 Schedule (rev 1)

This page last changed on Jan 29, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

Mack has been cold tested with new hand and new valves and Roman Flush run to check tubing.

Temp calibration Jan 29-31.

Feb 5,6,7 Science will prep reagents, generate mission script, run sub-protocol tests

1. One month cold test of Mack w/ his new valves/hand starting Feb 11.
 - a. OBJECTIVE: get through a full carousel of pucks
 - b. test should last most of 4 weeks (although 3 weeks would be acceptable)
2. March 3 is earliest we pull and deem a success. Once pulled, we replace with Bruce in chamber.
3. Prep for Spring deployments (Mar 26-->Mar 27)
4. **Deploy** MACK (April 1-Shana Rae)
 - Cold test Bruce (Mar 17 - Mar 28) and Neo (Mar 31 - Apr 11)
5. **Recover** MACK, **Deploy** BRUCE (May 1)
6. **Recover** BRUCE (May 27), **Deploy both** MACK and NEO (May 28)
7. End mission Jun 30.

(Revised 29 Jan 2008)

2008 Q1-Q2 Schedule (rev 2)

This page last changed on Jan 31, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

Mack has been cold tested with new hand and new valves and Roman Flush run to check tubing.

Temp calibration Jan 29-Feb 5.

Science gets MACK Feb 6 and will prep reagents, generate mission script, run sub-protocol tests

1. One month cold test of Mack w/ his new valves/hand starting Feb 14.
 - a. OBJECTIVE: get through a full carousel of pucks
 - b. test should last most of 4 weeks (although 3 weeks would be acceptable)
2. March 6 is earliest we pull and deem a success. Once pulled, we replace with Bruce for box test.
3. Prep for Spring deployments (Mar 14 --> Mar 19)
4. **Deploy** MACK (March 20-Shana Rae)
 - a. **Recover** MACK Apr 10, **Deploy** BRUCE -- Shana Rae
5. **Recover** BRUCE, **Deploy** MACK (May 1 -- Zephyr)
6. **Recover** BRUCE (May 27), **Deploy both** MACK and NEO (May 28 -- Zephyr)
7. End mission Jun 30.

(Revised 31 Jan 2008)

2008 Q1-Q2 Schedule (rev 3)

This page last changed on Feb 07, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

Mack has been cold tested with new hand and new valves and Roman Flush run to check tubing.

Temp calibration Jan 29-Feb 11.

Science gets MACK Feb 11 and will prep reagents, generate mission script, run sub-protocol tests

1. One month cold test of Mack w/ his new valves/hand starting Feb 19 (this is earliest possible day).
 - a. OBJECTIVE: get through a full carousel of pucks
 - b. test should last most of 4 weeks (although 3 weeks would be acceptable)
2. March 11 is earliest we pull and deem a success. Once pulled, we replace with Bruce for box test.
 - a. i. Once Mack into box testing, we schedule ship dates.
3. Prep for Spring deployments (Mar 14 --> Mar 19) These dates may slip.
4. **Deploy** MACK (March 20-Shana Rae)
 - a. **Recover** MACK Apr 10, **Deploy** BRUCE -- Shana Rae
5. **Recover** BRUCE, **Deploy** MACK (May 1 -- Zephyr)
6. **Recover** BRUCE (May 27), **Deploy both** MACK and NEO (May 28 -- Zephyr)
7. End mission Jun 30.

2008 Q1-Q2 Schedule (rev 4)

This page last changed on Feb 14, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

Mack has been cold tested with new hand and new valves and Roman Flush run to check tubing.

Science gets MACK Feb 19 and will prep reagents, generate mission script, run sub-protocol tests

1. One month cold test of Mack w/ his new valves/hand starting Feb 25 (this is earliest possible day).
 - a. OBJECTIVE: get through a full carousel of pucks
 - b. test should last most of 3 weeks
2. March 17 is earliest we pull and deem a success. Once pulled, we replace with Bruce for box test.
 - a. i. Once Mack into box testing, we schedule ship dates.
3. Prep for Spring deployments (Mar 17 --> Mar 30)
4. **Deploy** MACK (March 31-Shana Rae)
 - a. **Recover** MACK Apr 17, **Deploy** BRUCE -- Shana Rae
5. **Recover** BRUCE, **Deploy** MACK (May 1 -- Zephyr)
6. **Recover** BRUCE (May 27), **Deploy both** MACK and NEO (May 28 -- Zephyr)
7. End mission Jun 30.

Dates after March 31 Shana Rae are flexible, until Zephyr takes over...

2008 Q1-Q2 Schedule (rev 5)

This page last changed on Feb 26, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

Mack has been cold tested with new hand and new valves and Roman Flush run to check tubing.

Science gets MACK Feb 26 and will prep reagents, generate mission script, run sub-protocol tests

1. One month cold test of Mack w/ his new valves/hand starting Mar 7.
 - a. OBJECTIVE: get through a full carousel of pucks; run it hard to make Mar 24 preparation
2. Once Mack finished with box test, we replace with Bruce for box test.
 - a. Once Mack into box testing, we schedule ship dates.
3. Prep for Spring deployments (Mar 24 --> Mar 30) **Deploy** MACK (March 31-Shana Rae)
 - a. **Recover** MACK Apr 17, **Deploy** BRUCE -- Shana Rae
4. **Recover** BRUCE, **Deploy** MACK (May 1 -- Zephyr)
5. **Recover** BRUCE (May 27), **Deploy both** MACK and NEO (May 28 -- Zephyr)
6. End mission Jun 30.

Dates after March 31 Shana Rae are flexible, until Zephyr takes over....

2008 Q1-Q2 Schedule (rev 6)

This page last changed on Mar 27, 2008 by [jbirch](#).

Outline of instrument plan for Jan-Jun, 2008

1. One *week* cold test of Mack w/ his new valves/hand starting Mar 17.
2. Once Mack finished with box test, we replace with Bruce for box test.
3. **Deploy** MACK (April 3-Shana Rae)
 - a. **Recover** MACK Apr 21, -- Shana Rae
4. **Deploy** MACK (May 1 -- Zephyr)
5. **Recover** MACK (May 27), **Deploy both** BRUCE and NEO (May 28 -- Zephyr)
6. End mission Jun 30.

(ed. Mar 27, 2008)

Machinist build schedule (Feb 2008)

This page last changed on Mar 13, 2008 by pami.

Priority, What we need, (number).

Black --> we do in house, Blue --> can be sent out (Mike decides)

- ~~1, Mushroom caps - 1003526-004 - (20) - Mike has made (5) and will send the rest out for quote (1/31/08) - Rcvd 3/3/08~~
- ~~1, Bulkhead V. mounting brackets - P-200325-07 - (6) (02/04/08) {} 1-Mike, Waste container supports - 1003526-003 - (6) - Mike has sent prints out for bid (1/31/08) PO #0810307 - Rcvd 3/3/08~~
- ~~-1-Mike, - Bag Hanger Assemblies - 1003523-01-02-03 - (5) - Mike has sent prints out for bid (1/31/08) PO #0810307 - Rcvd 3/3/08~~

Bag Assembly Parts	For 5 Instruments	We currently have	We thus need (minimum)
Hoops	10L 5mL 15sm	4L 1mL 2sm	6L 4mL 13sm (02/11/08)
Crescent Closet Bar	7	3	4 Rcvd 3/3/08
Bushing Assemb 4/ instrument	20	14	6 None Needed

- 2, Modem Battery cylinder - 10020051-01 - (1)
- ~~2, Sample ports - 1002516 - (4) (2/19/08)~~
- 2, spin can zinc down (3)
- 2, can-side CTD bracket (2)
- 2, sample intake copper screen holder - 1002516-02 - (4)
- 2, bail locking plates (4)
- 2, adaptor plate for mooring (2)
- ~~2, Shaft Adapter for Maxon-to-Valve - Replacement for ShaftLoks - (qty. 30?) - Provided Aluminum qty. 8. Still need ?~~
- ~~3, CTV mount - 1002330-019 - (3) (2/04/08)~~
- ~~3, forearm motor shaft adaptor - 1002451-006 - (2) (02/05/08)~~
- ~~3, finger motor shaft adaptor - 1002451-006 short - (2) (02/05/08)~~
- ~~3, slot the encoder shafts (8) (02/11/08)~~
- ~~3 Parker Pucker Un-Stuckers - Solids and Prints ready (02/12/08)~~

Lessons Learned meeting after September 2011 Drifter Cruise to Station Aloha, Hawaii

- Shipping van fan velocity needs to be turned down if we are to work inside. Noise is not too bad, but air velocity stirs up lots of dust.
- Van left MBARI Aug 17, arrived Hawaii Aug 25. KM deployed Sep 6. This was barely enough time to get everything ready. In future, when running PCR, we need **3 weeks minimum** to prepare.
- MFB preparations. We should get it ready, but once arrived, do full runs and spot-compare to pre-shipping.
- Must have extra tools here at home, so traveling group does not clean us out.
- Rigging box spares in case we deploy back home at same time.
- This deployment (Sep 7-17) used 1400 minutes of Iridium air time. Was slow and dropped frequently. Seas were calm so no need for constant engineering data to be transferred.
 - Was discussion of how to compress files to more efficiently send via Iridium. Perhaps .JPG conversion of TIFF's?
- Retrieved NO DATA from the PAR sensor. PAR log says it rec'd a ctrl-C character, which stopped data logging. Perhaps happened when ESP re-powered? We need either NO comms to PAR so it's always running, or TOTAL comms, so we can query it and restart if necessary.
- Important to time-sync all ADCP's with the ship.

Many other engineering issues learned are in this document:

1. [Lessons Learned from CMORE Hawaii cruise \(Sept 2011\)](#)

ESP Image Analysis Application

This page last changed on Mar 14, 2017 by [brian](#).

Before you Start

1. You'll need Java 8 (or better) installed on your computer. Most likely your computer already has this installed. But if not, got to <http://java.com>.
2. [Download the jar file](#) to your computer.
3. Double-click the jar to run the app.

You can also get the automated image analysis application [here](#)

Automated Image Analysis.

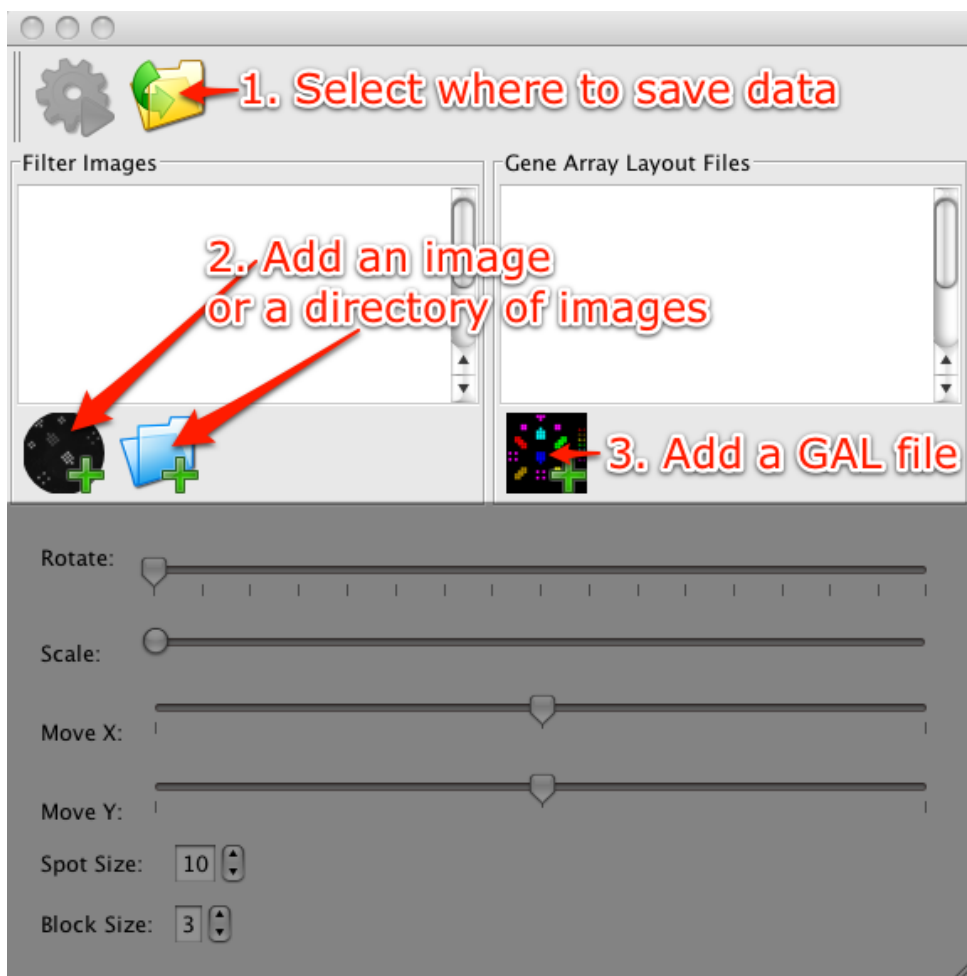
Just isn't there yet. That's why I developed the user interface below. Notes on what's been explored can be found [here](#).

I'm working on a new method. Documentation is [here](#)

How to use it

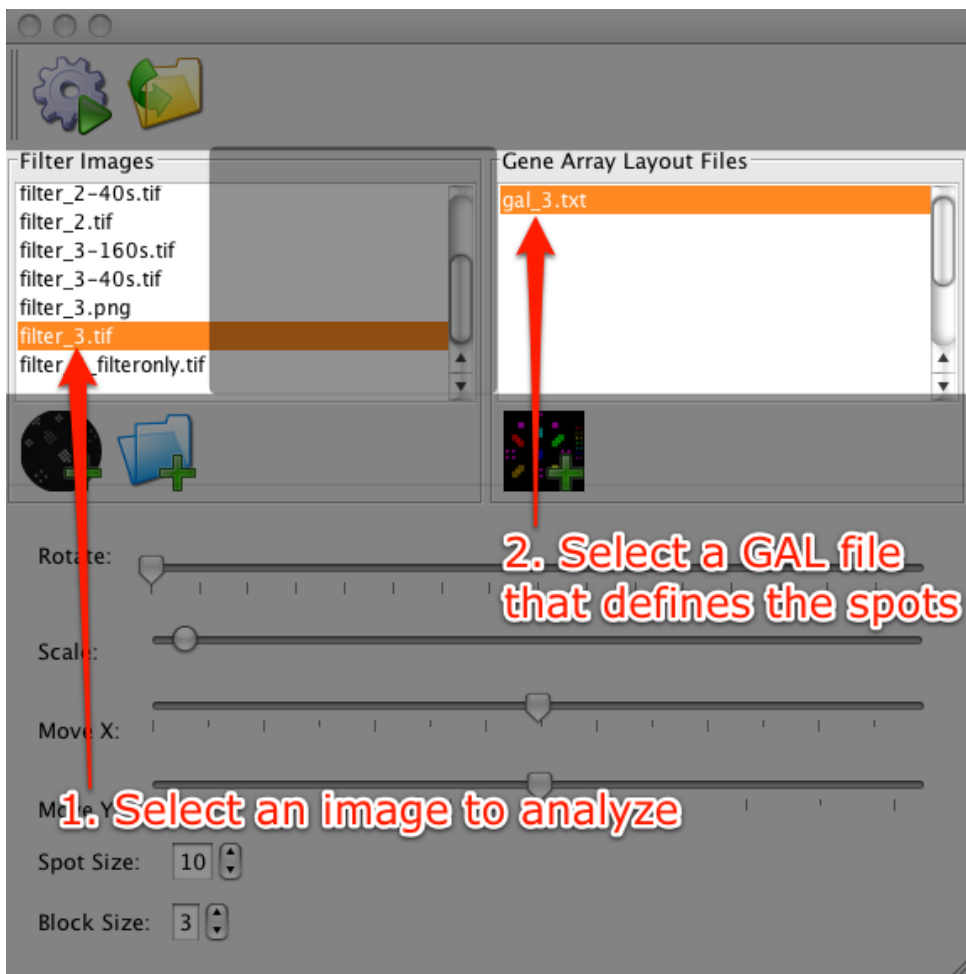
Setup

Configure your settings. Some settings, such as the directory you want to save data into, are preserved between sessions.



Selection

Select the image you want to analyze along with the corresponding spot-definition (aka GAL) file. The application knows how to extract a single filter from a GAL that defines multiple filters. However, it assumes that all filters defined in a GAL are essentially identical.



Alignment

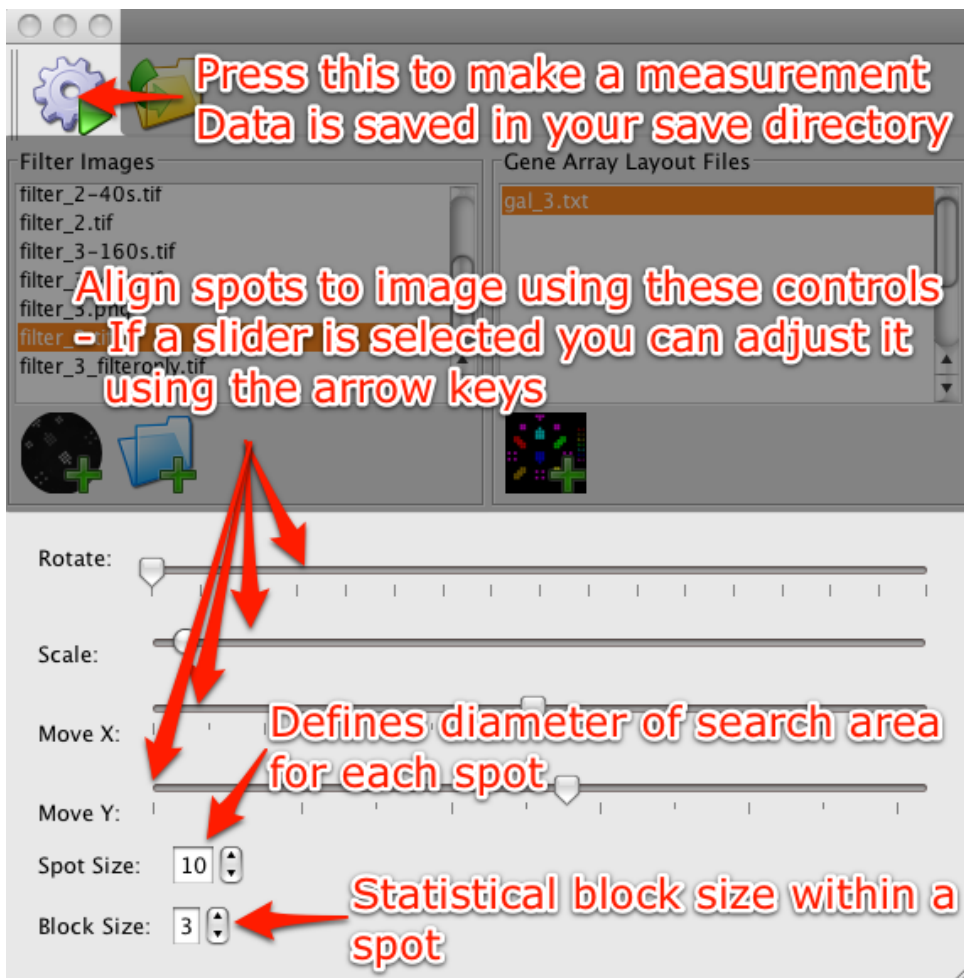
When you select an image and its corresponding GAL, a new window will pop up overlaying the expected spots onto your image. Your job is to align the spots in the GAL with those on the image. Besides, rotation, scaling and translation of the spots, you can also increase the spot search area (aka diameter).

Alignment can be done directly on the image or using the sliders on the application

Aligning using Image Controls



Aligning using Slider Controls



Results

When you press the *Analyze Image* button, 2 data products are created:

1. An image with the mean intensity values overlaid
2. A tab-delimited text file with intensity statistics.

Each file is named after the image being analyzed. In addition, the filename has the UTC date that the sample was analyzed appended. For example, analyzing an image named *filter_3.tif*, will create files like *filter_3-20090430221134.png* and *filter_3-20090430221134.txt*.

How is the Intensity Calculated?

The analysis results are based on:

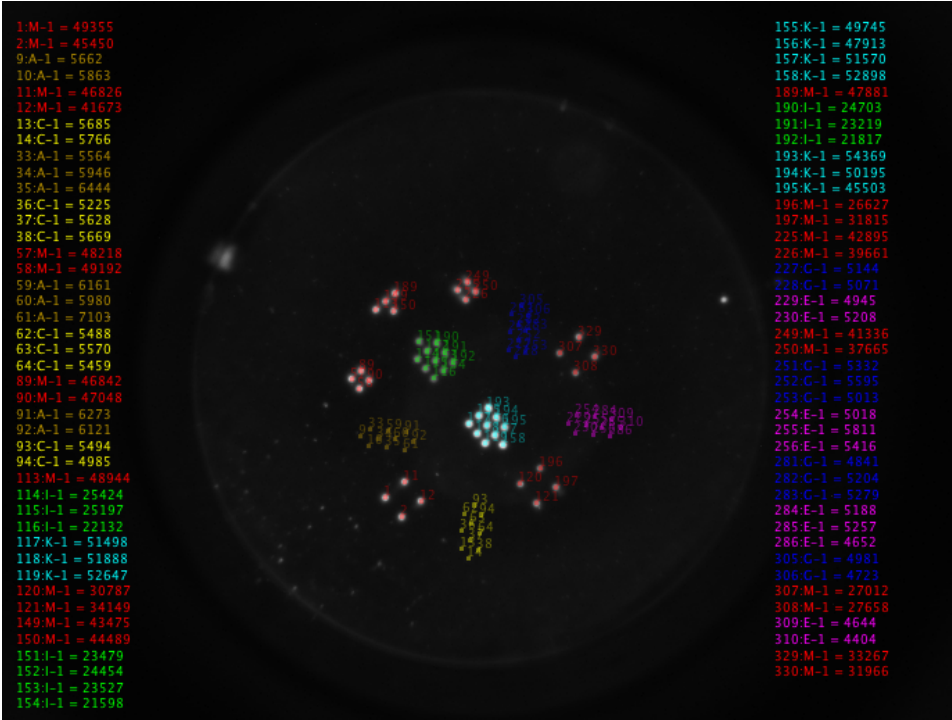
1. the spot diameter
 - The spot diameter defines the area that will be examined for a particular spot.
2. the block size.
 - Defines the width and height of the area to be averaged for mean intensity.
 - For example, a block size of 3 will calculate the mean for a 3 pixel by 3 pixel block.

A spot is analyzed as follows:

1. The mean intensity for every *block* (defined by block size) that fits in the circle defined by *spot diameter* is calculated. This is done separately for each spot.

2. The highest mean intensity value for a given spot is selected.
3. Statistics are calculate based on the location of the selected *block*
4. The location and size of the selected *block* is overlaid onto the results image so you can view exactly which pixels the mean intensity values are calculated from.

Image Result



Data Result

SpotNumber	SourceWell	Area	Mean	Median	Std	Min	Max
1	M-1	9	49355.0	48604	3539.1	43383	54869
2	M-1	9	45450.4	45237	3079.1	40195	49597
9	A-1	9	5662.1	5543	276.5	5327	6037
10	A-1	9	5863.2	5859	276.8	5451	6288
11	M-1	9	46826.3	47433	3527.7	40002	51593
12	M-1	9	41673.3	41311	5130.4	30775	47634
13	C-1	9	5684.9	5703	105.0	5530	5827
14	C-1	9	5766.2	5758	134.0	5548	6039
33	A-1	9	5564.0	5639	214.3	5294	5845
34	A-1	9	5945.6	5931	188.0	5671	6170
35	A-1	9	6444.4	6452	246.2	6127	6893
36	C-1	9	5225.2	5162	207.0	4906	5492
37	C-1	9	5627.9	5539	330.1	5185	6376
38	C-1	9	5669.4	5615	231.1	5375	6160
57	M-1	9	48217.7	47461	6614.6	35229	55771
58	M-1	9	49192.3	49033	6575.7	35924	57107
59	A-1	9	6161.3	6159	190.3	5933	6543
60	A-1	9	5979.8	6066	345.0	5545	6597
61	A-1	9	7102.6	6759	1233.1	5967	9732
62	C-1	9	5487.8	5491	100.7	5355	5626
63	C-1	9	5570.3	5510	176.3	5255	5807
64	C-1	9	5459.4	5419	133.5	5235	5641
89	M-1	9	46842.1	48813	5160.4	37888	52613
90	M-1	9	47047.8	47124	4265.9	38956	52583
91	A-1	9	6272.9	6315	439.5	5284	6872
92	A-1	9	6121.4	6141	103.7	5941	6317
93	C-1	9	5494.0	5515	174.1	5303	5767
94	C-1	9	4985.1	4965	124.4	4803	5149

113	M-1	9	48944.3	49991	3707.7	42914	53405
114	I-1	9	25423.6	25613	1422.0	22955	27031
115	I-1	9	25197.3	25670	988.3	23421	26450
116	I-1	9	22132.4	22443	1272.5	19932	23443
117	K-1	9	51498.3	51759	2560.4	47191	55187
118	K-1	9	51888.1	52335	1953.1	49773	55666
119	K-1	9	52646.9	52985	2061.7	49485	55796
120	M-1	9	30787.3	30075	3475.8	23921	35206
121	M-1	9	34149.1	33959	2733.5	29768	37348
149	M-1	9	43475.1	43663	3603.0	38100	48773
150	M-1	9	44489.3	44609	3332.0	39065	49303
151	I-1	9	23479.1	23175	1384.3	20487	25171
152	I-1	9	24453.8	24841	1268.0	22381	25655
153	I-1	9	23526.8	23690	1187.2	21538	24913
154	I-1	9	21597.7	21709	1017.7	19604	22678
155	K-1	9	49745.0	50732	2936.6	44501	52759
156	K-1	9	47913.0	48388	2031.7	43423	50437
157	K-1	9	51569.7	51321	2375.2	48169	55215
158	K-1	9	52897.6	52851	2552.0	47967	56047
189	M-1	9	47880.7	49051	2907.6	44013	53047
190	I-1	9	24703.0	24444	708.3	23487	25453
191	I-1	9	23219.3	23389	1014.5	21703	24619
192	I-1	9	21817.2	22028	1010.8	19986	23403
193	K-1	9	54369.1	54732	3718.3	46532	58461
194	K-1	9	50194.6	50399	2553.9	45703	53492
195	K-1	9	45502.8	44757	2679.8	41538	48237
196	M-1	9	26627.3	27296	2518.6	22277	28987
197	M-1	9	31814.9	32016	1982.2	28295	34746
225	M-1	9	42895.4	43709	4152.5	34537	47623
226	M-1	9	39661.4	39303	3612.6	33975	44311
227	G-1	9	5144.4	5127	221.5	4734	5587
228	G-1	9	5070.7	5139	298.5	4457	5575
229	E-1	9	4945.2	4971	133.0	4764	5193
230	E-1	9	5207.7	5205	87.9	5085	5343
249	M-1	9	41336.3	42004	2850.3	35625	45492
250	M-1	9	37665.2	38325	2081.2	34699	40801
251	G-1	9	5331.7	5387	138.8	5093	5550
252	G-1	9	5594.6	5527	147.4	5398	5792
253	G-1	9	5012.8	5011	125.8	4869	5259
254	E-1	9	5017.9	5034	129.5	4703	5139
255	E-1	9	5810.6	5767	466.6	5395	6926
256	E-1	9	5415.9	5379	171.3	5195	5705
281	G-1	9	4841.2	4835	145.3	4635	5095
282	G-1	9	5204.3	5143	146.4	5015	5403
283	G-1	9	5278.7	5249	271.8	4974	5822
284	E-1	9	5187.6	5143	135.8	5083	5519
285	E-1	9	5257.4	5282	66.5	5113	5323
286	E-1	9	4652.3	4648	151.5	4414	4918
305	G-1	9	4980.6	4964	168.7	4751	5307
306	G-1	9	4723.1	4763	82.8	4591	4804
307	M-1	9	27011.7	27094	1546.5	23564	28924
308	M-1	9	27658.3	28069	1809.2	24951	29929
309	E-1	9	4644.2	4662	80.3	4523	4731
310	E-1	9	4403.9	4429	134.1	4148	4559
329	M-1	9	33267.1	32311	3910.5	25015	36996
330	M-1	9	31966.2	33229	3090.1	26878	35366

ESP Automated Image Analysis 4

This page last changed on Apr 17, 2012 by [brian](#).

This page is obsolete, but please **do not delete** this page. It links images that we use on other wiki pages.

The new page of interest is [ESP Image Analysis Automation](#)

This page last changed on Jun 07, 2011 by [brian](#).

Steps Required for Automated Image Analysis

1. [Identifying spots on the filter image \(*Spot Segmentation*\)](#)
2. [Extracting a single filter from the GAL file \(*GAL Extraction*\)](#)
3. [Aligning the GAL spots with the filter spots \(*Pattern Matching*\)](#)
4. [Extracting the intensities values from the filter image \(*Data Extraction*\)](#)

See also: [Applying Fiducial Marks](#)

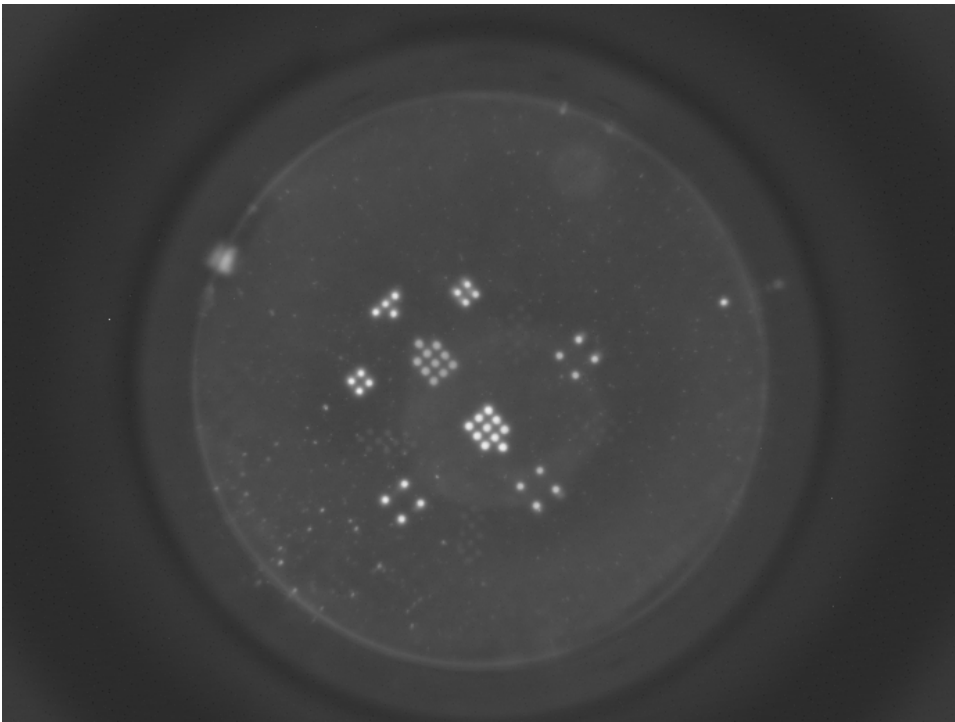


Image Coordinate Systems

For this work, all data is referenced using the *image coordinate system*. The upper left corner of an image is the origin (e.g. 0,0). +X is right, +Y is down.

Example Image

For this document I will be using this image as my filter sample:

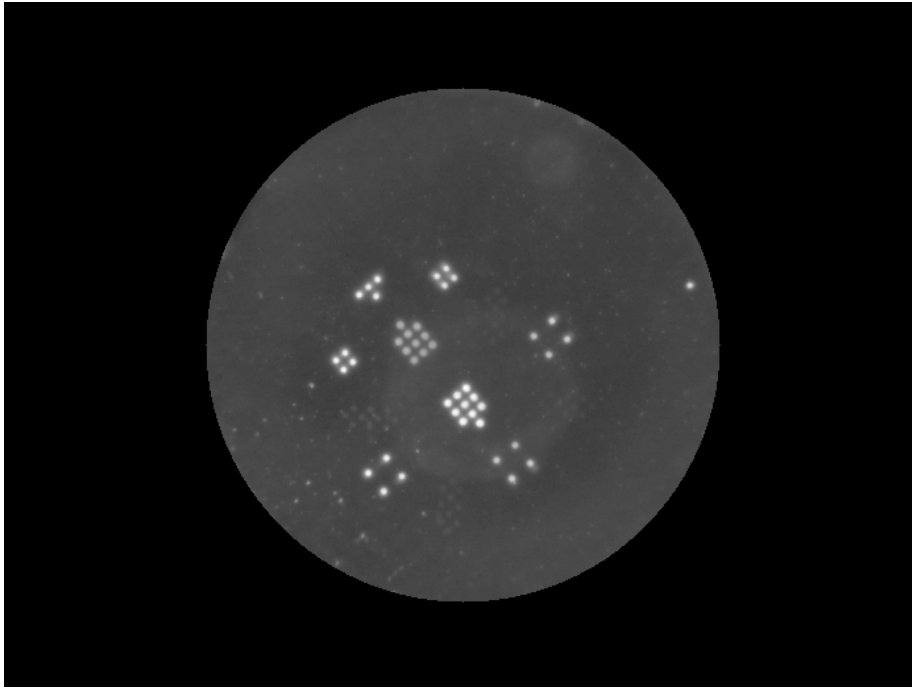


Spot Segmentation

In order to identify the spots on the filter image I tried the following:

Remove areas outside the filter boundaries from the filter analysis.

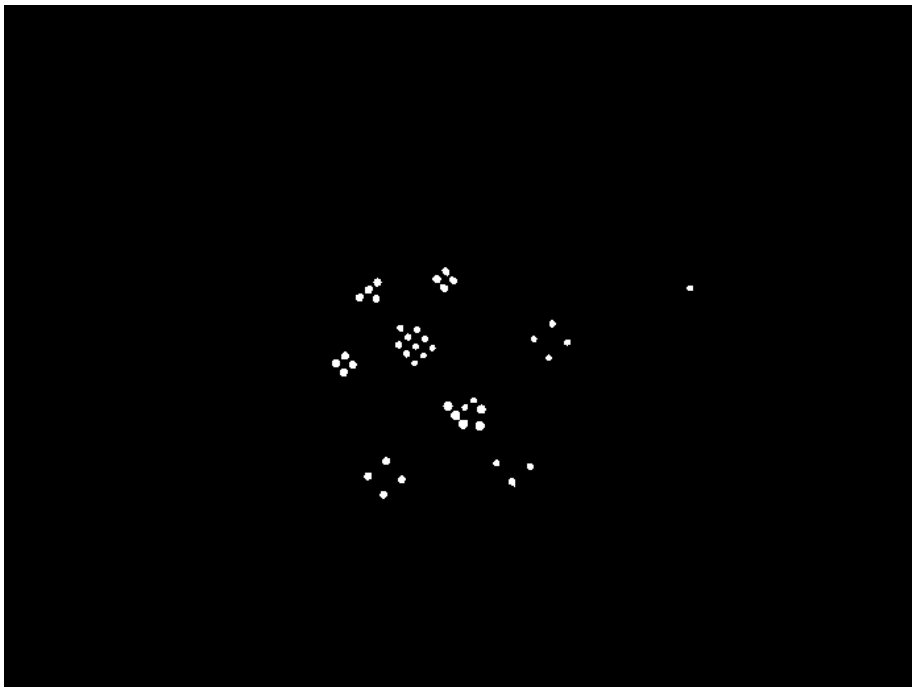
- This was determined by using a acceptance radius = $(\text{ImageHeight} / 2) * 0.25$. Pixels out side this radius are ignored
- This is important since the edge of the disk creates high intensity artifacts in the filter image.



```
ImageIOService io = new org.mbari.esp.imaging.services.impl.ImageIOServiceImpl();
ImagePlus ip = io.read((new File('filter_3.tif')).toURI().toURL());
(new org.mbari.esp.imaging.RemoveNonFilterAreaOperation(ip.getProcessor())).run();
io.write(new File('filter_3_roi.png'));
```

Apply a thresholding technique to locate spots.

- From testing a variety of thresholding techniques, the *maximum entropy threshold* provided the most reliable spot resolution.



```
ImagePlus ip; // see above code for generating ROI image
GeneArrayAnalysisService gaas = new
org.mbari.esp.imaging.services.impl.GeneArrayAnalysisServiceImpl01();
ImagePlus mask = gaas.mask(ip);
io.write(new File('filter_3_roi_masked.png'));
```

Resolving Spots Issue #1: Spot Size

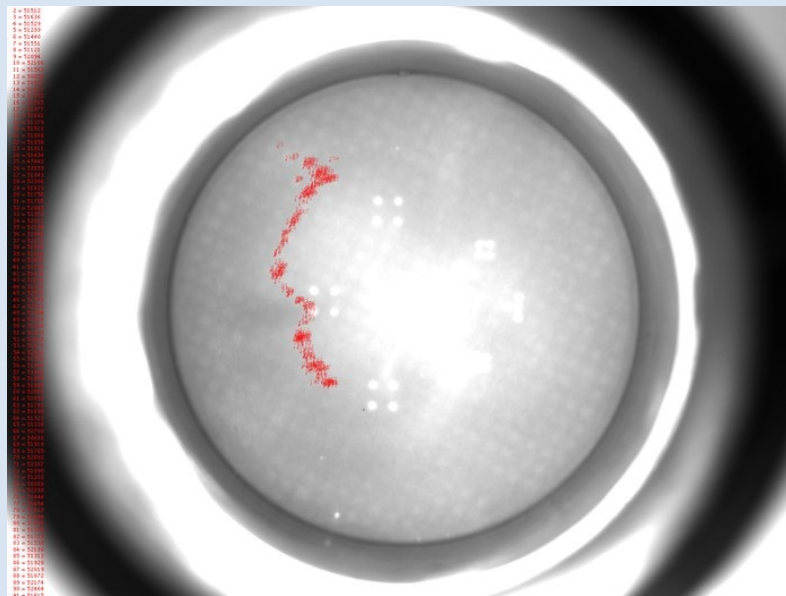
Spots are expected to be roughly uniform size. To remove outlier spots I run statistics on the spots sizes that appear in the mask and use 90% confidence interval. Spots with sizes out side this range are rejected unless they're size is within a few pixels of a spot that was within the acceptable range. For example, given a set of spot sizes of (20, 12, 11, 10, 9, 8) with accepted spots of (12, 11, 10, 9), 8 would be accepted since it's close to 9 but 20 would not.

Resolving Spots Issue #2: Spots Blurring Together

In areas of bright spots grouped together, it can be difficult to separate individual spots as they blur together when masked. I tried a technique of dilating spots (actually makes the spots smaller) to resolve individual bright spots. Notice in the masked image above that some spots that are discernible to the eye were removed by the code because they blurred together, resulting in a spot with a size that's outside the confidence limits

Resolving Spots Issue #3: Bright Image

There are problems with the thresholding technique when the image is saturated. The image below illustrate the misidentification of spots; red dots indicate where the spots were detected.

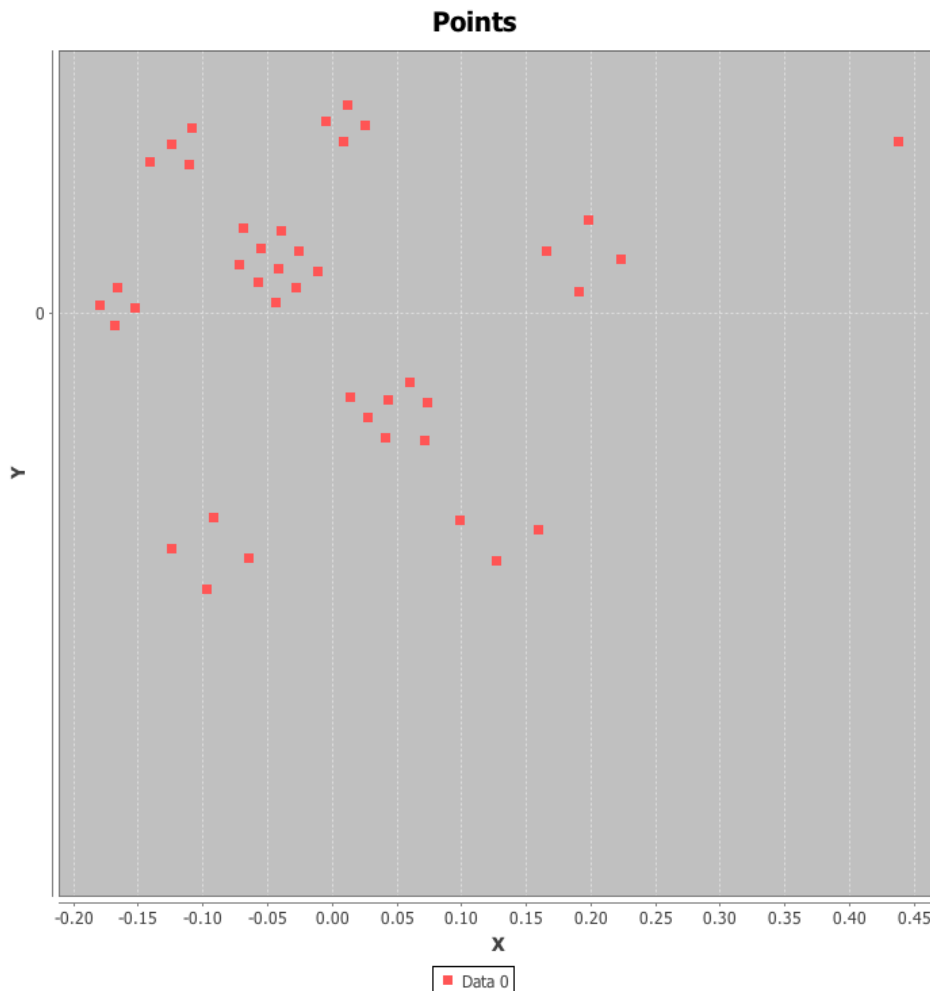


Resolving Spots Issue #4: Bright 'Noise'



Extracting Spot Locations

Once a mask has been created it's relatively easy to 'extract' the spot location. For my analysis, I searched each spot, as defined by the mask, for the brightest 3x3 pixel block within the spot and used that as the spot location. This is useful for attempting to apply point-matching algorithms.



```

ImagePlus ip; // see above code for generating ROI image
GeneArrayAnalysisService gaas = new
org.mbari.esp.imaging.services.impl.GeneArrayAnalysisServiceImpl01();
/*
 * Key = unique, but arbitrary, spot ID
 * Value = x,y location of upper left corner of mean block. z is mean intensity of 3x3 block
 */
Map<Integer, Point3D<Double>> pointMap = gaas.extractIntensities(ip, 3);

```

GAL Feature Extraction

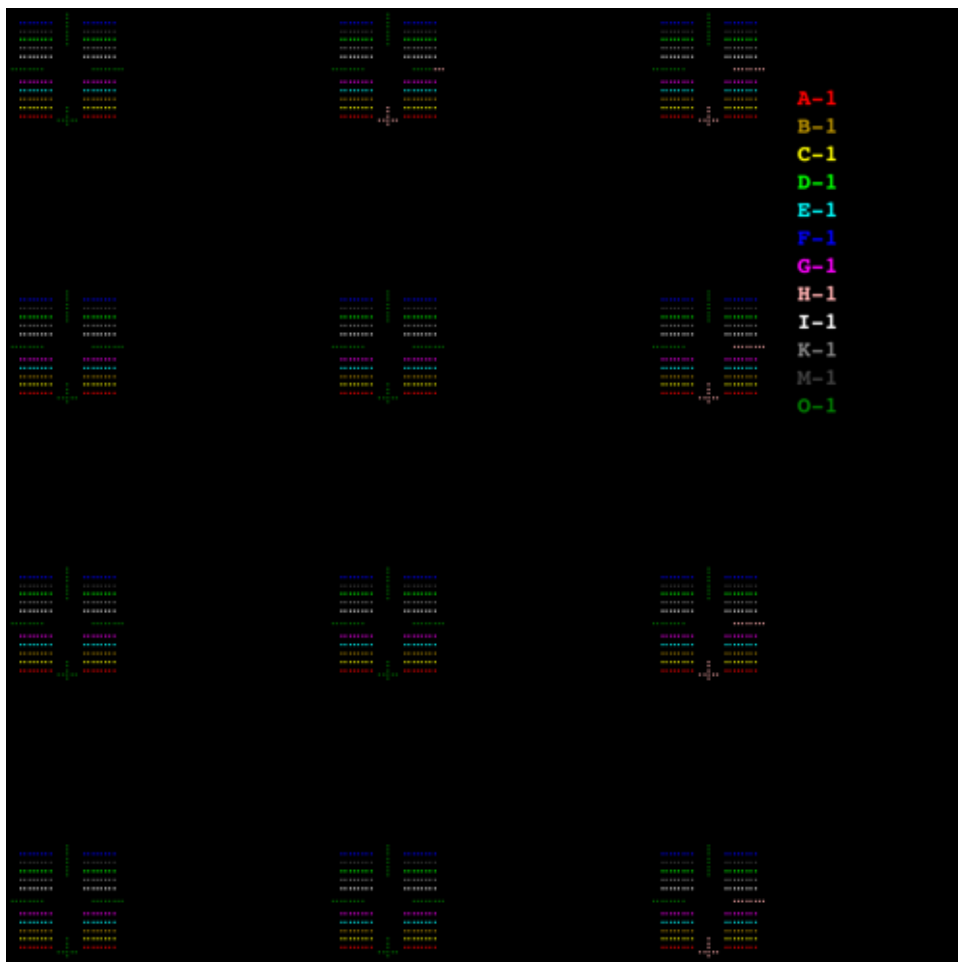
About GAL Files

Gene-array Layout Files (GAL) define the spots to be printed onto the filter by a piezzo-electric printer. A single GAL file defines multiple filters.



ESP GAL files aren't real GALs!

Our printer uses a custom file format. So, while we call them GAL's, since they serve that role, they aren't real GAL files



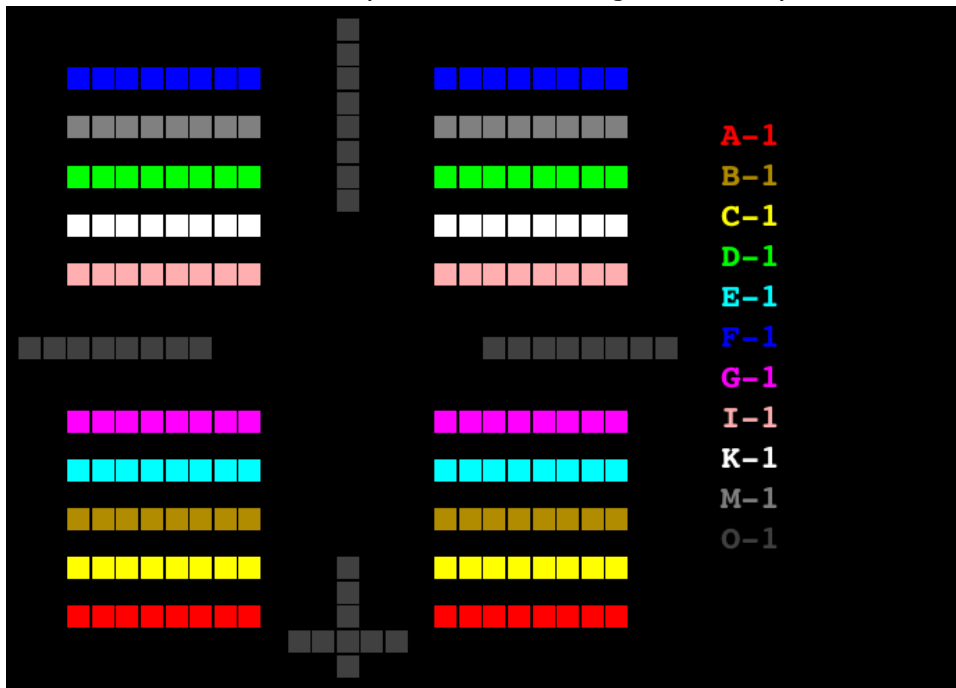
```

GeneArrayIOService io = new org.mbari.esp.imaging.services.impl.GeneArrayIOServiceImpl();
List<GALPoint> points = io.read((new File('my_gal.txt')).toURI().toURL());
BufferedImage image = PiezzoArrayUtil.arrayToColorGrid(points, true, 100);
ImageIO.write(image, "png", new File("my_gal.png"));

```

Isolating a Single Filter from the GAL points

With a little *apriori* knowledge, this is pretty simple. Since there is a relatively large spacing between filters, I just create a spot defining the upper left corner (e.g. minimum x and y value of all points), define a box of a certain size (in our case I'm using 12500 units) and remove everything outside the box.

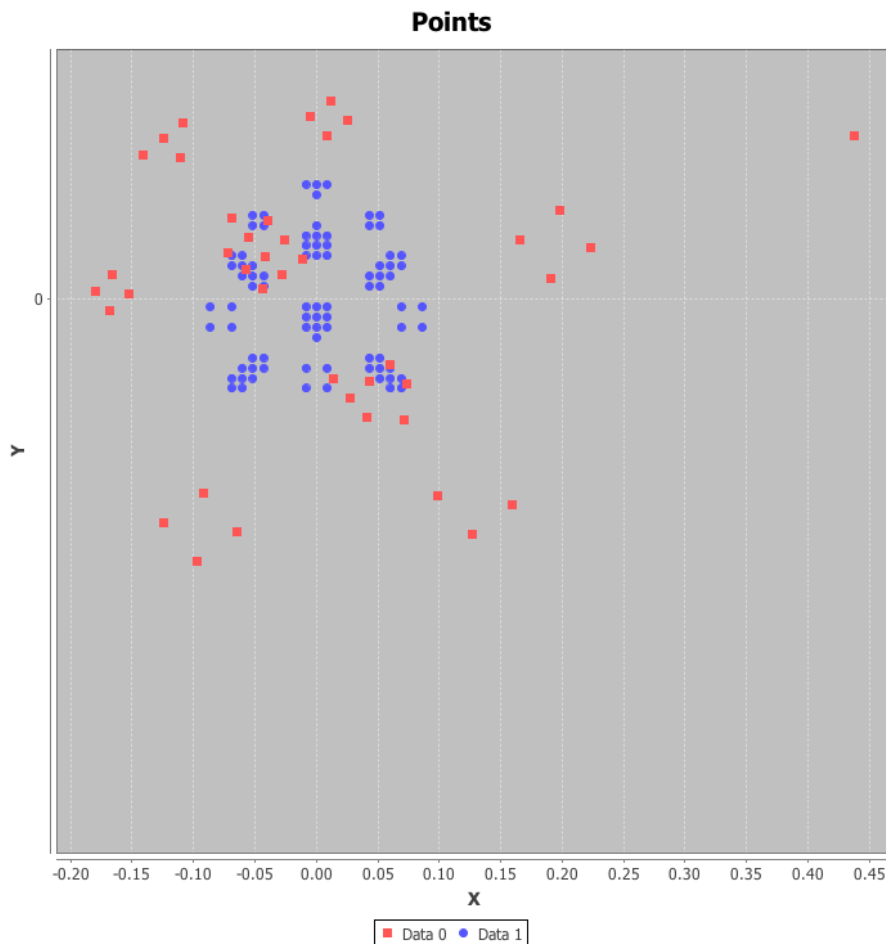


```
List<GALPoint> allFilters = io.read((new File('my_gal.txt')).toURI().toURL());
List<GALPoint> oneFilter = PiezzoUtilities.filterSingleSpot(allFilters, 12500);
```

Pattern Matching

At this point we have 3 important things:

1. The original filter image
2. Location of a number of spots from the image
3. Location of spots for a single filter as defined in the GAL file.



There are a number of techniques for pattern matching. A few that I've explored are described below:

Log-polar transformation.

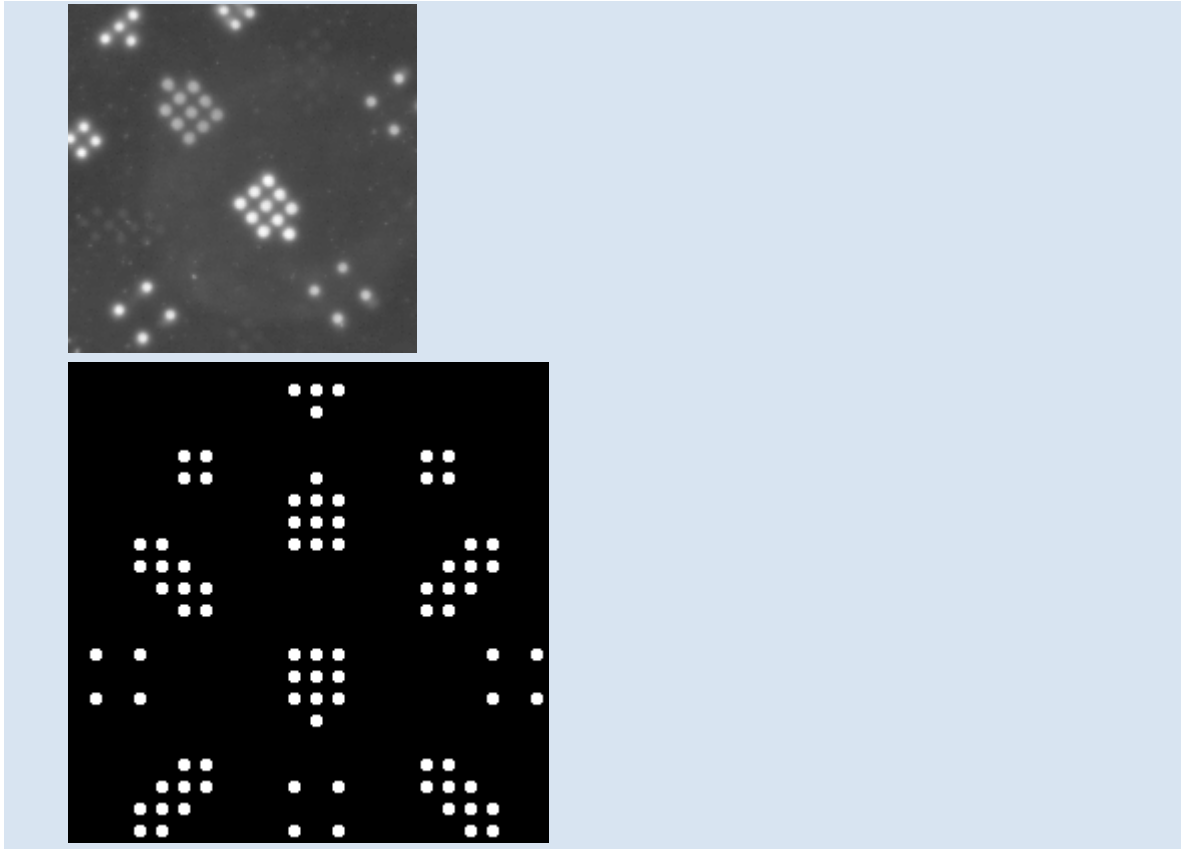
References

[Image registration using log-polar mappings for recovery of large-scale similarity and projective transformations.pdf](#)

Evaluation

At first brush, this seems the ideal technique for image registration. It handles rigid transformations involving scaling, rotation, and translation. In order to use this technique I generated an *ideal image* of the GAL points and attempted to align that with the filter image. For the test image, I was able modify the transform to accurately align rotation and give relatively good translation. However I was never able to get the image to scale correctly. This is in part due to the similarity of the patterns used in the image. The log-polar transform would create a peak correlation on the wrong patterns between the image. It should also be noted that other test images produced widely varying results. So I do not consider the technique reliable, although with more time, it may be possible to improve upon it.

Initial Images



Log-polar Transform of Images

NOTE The GAL points image was duplicated vertically to allow account for wrapping of rotation when the cross-correlation is performed

Fourier-Mellin Transform

This is essentially a log-polar transform in Fourier space. I did not have time to pursue it.

Robust Point Set Registration Using Mixture of Gaussians

References

<http://code.google.com/p/gmmreg/>

Evaluation

This is a point set registration technique, so instead of attempting to align images, we are trying to match to different sets of points. This technique allows for both rigid and non-rigid point-set registration, although, in our case, we are only interested in rigid registration. (Non-rigid registration warps the points to fit, which we do not want) I ran the open-source code on our data samples and did not have any luck. I also passed the data on to the author, Bing Jian of this technique. He also was not succesful with the registration. His comments were:

I took a look at the results and noticed the rigid registration result is not as good as the nonrigid one. Maybe it is because of the scaling issue.

Have you found any better solution yet? I think the symmetry presented in the data can cause the local minimum problem. Do you have any ground truth for this case? I guess I need to add a similarity transform to handle this case. BTW, I suggest using the point set with less points as model set for the gmmreg program, but it should not matter too much as both point sets are small.

Data Extraction

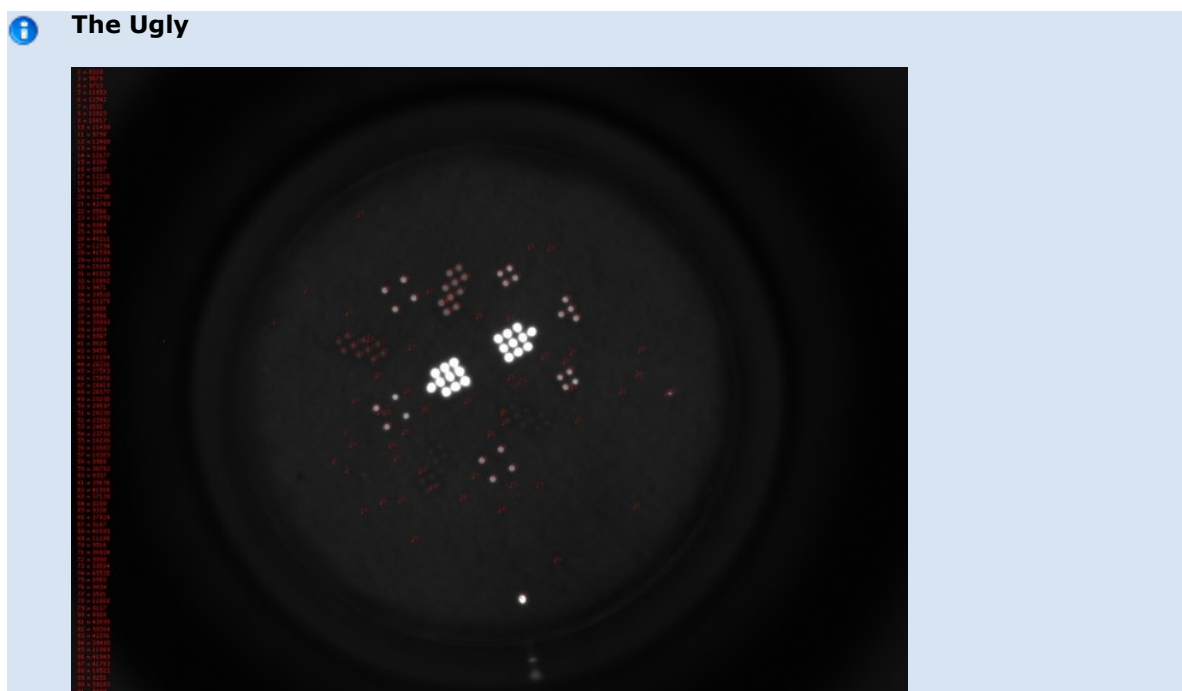
Without being able to align the filter image with the GAL points, it's impossible to:

1. Associate a spot with it's content
2. Accurately and reliable extract all spots of interest.

Here's a few examples of just trying to extract spots from an image:







Summary

The only hurdle that needs to be overcome at this point is [pattern matching/image registration](#)

Here are the significant hurdles for *pattern matching/image registration*:

1. Reliably extracting spots from the filter image
 - In my test images, I was only able to extract all spots in one image using thresholding techniques.
 - Another technique to try would be edge detection. This may be problematic in noisier images though.
2. Dealing with symmetry in the spot layout, this confounds most image registration techniques.
 - It would be great if I could get some **key spots** that I can reliably detect and differentiate from the other spots. For example, 2 spots that are near the edge of the disk. If I could extract

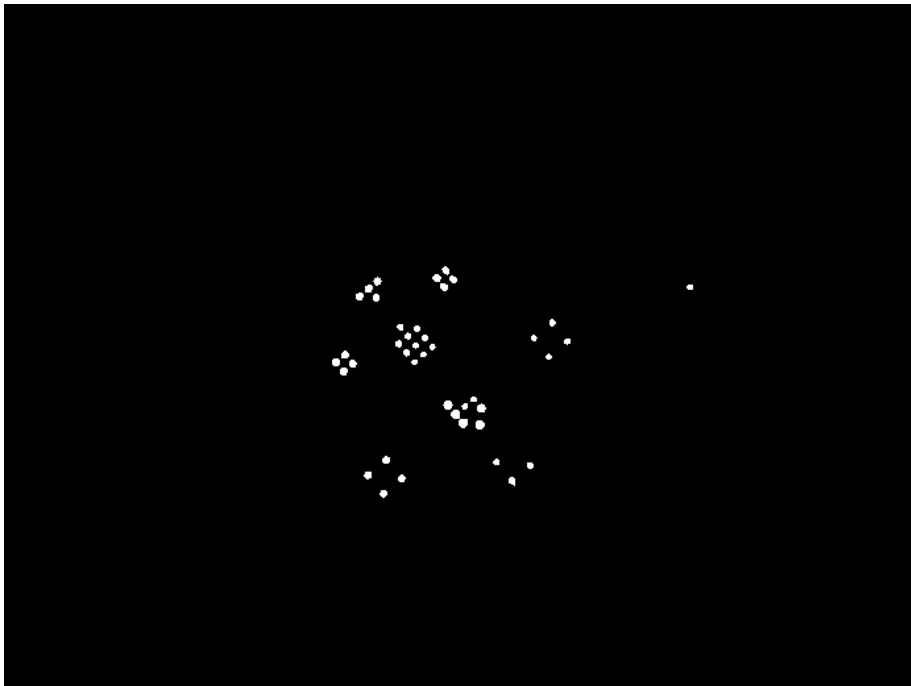
those then, I would be able to easily register the GAL file with the image. As an example, look at the image above and notice the single spot near the edge of the disk. If we had 2 of those on that image it would make my life much simpler!! 😊 Although in order to use those I would need to be able to extract the same 2 spots from the GAL file.

Applying Fiducial Marks for Image Analysis

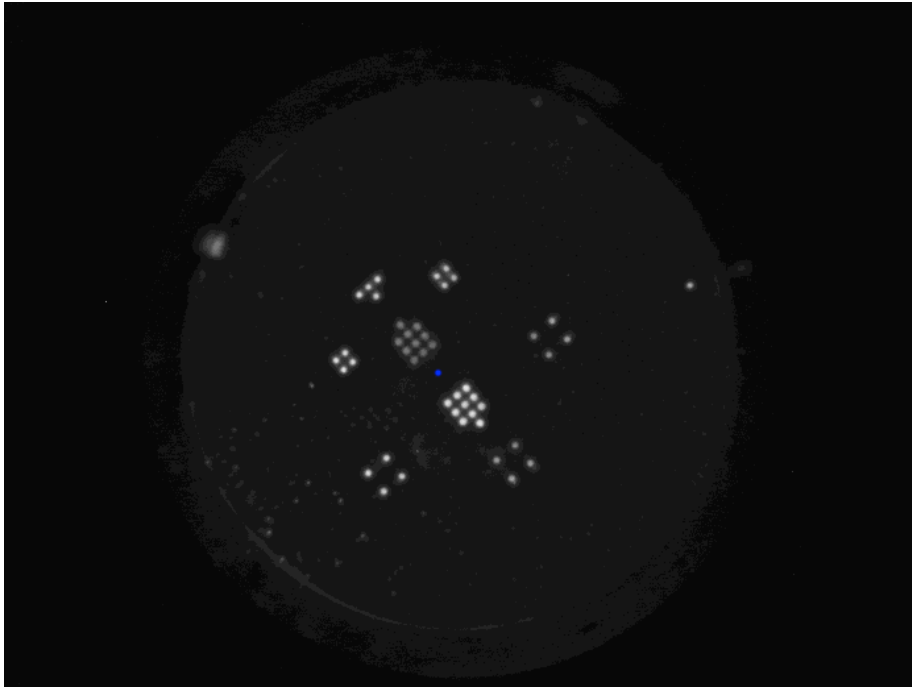
If the ESP arrays had distinct fiducial marks it should be possible to locate these marks and use them for scaling and rotation of the GAL to match the array image. Ideally these fiducial's should be either the closest points to the center of mass of the or the farthest points from the center of mass.

Applying Fiducials.

- During analysis we extract the spots that are visible using a thresholding technique. This gives an image like this:

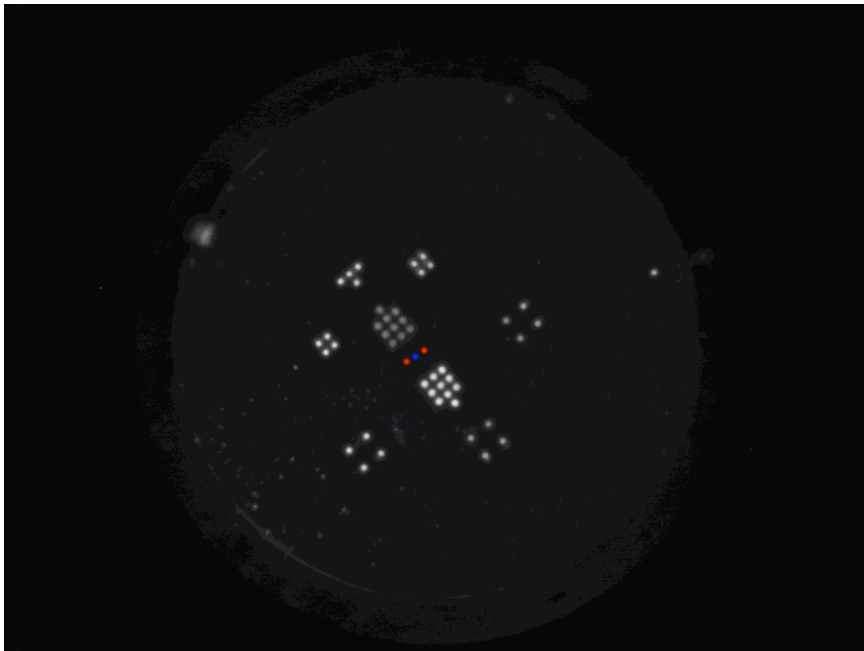


- From this mask we can calculate a center of mass of the image. (The blue dot represents the center of mass)

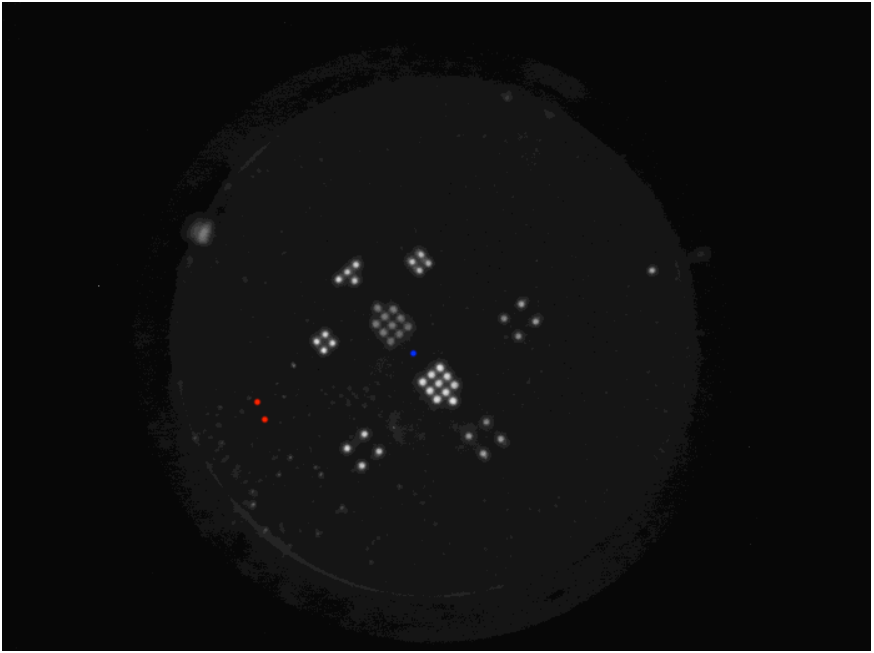


- To easily locate fiducial it would be best if they were either the points nearest the center-of-mass or farthest from it. The red dots in the images below represent notional fiducial points.

- Example of points nearest COM:



- Example of points farthest from COM:



ESP Image Analysis Automation

This page last changed on Mar 05, 2014 by [brian](#).

ESP Image Analysis Application

There is a standalone user interface for the ESP lab to run automated image analysis at <http://www.mbari.org/staff/brian/pub/esp-autoanalyzer.jar>.

Overview of ESP Image Analysis Automation

1. [Investigations into Automated Image Analysis](#)
2. [Extracting GAL Point Features](#)
3. [Extracting Image Point Features](#)
4. [Extracting Image Fiducial Features](#)
5. [Point Feature Alignment](#)

Source code

The source is hosted on at <https://bitbucket.org/mbari/esp-image-analysis>. The source is written in [Scala](#)

Extracting GAL Point Features

This page last changed on Apr 17, 2012 by [brian](#).

Overview

In order to automate the image processing, we need to know the layout of the spots as they were defined in the original GAL file. The instructions below illustrate the steps needed to extract this information.

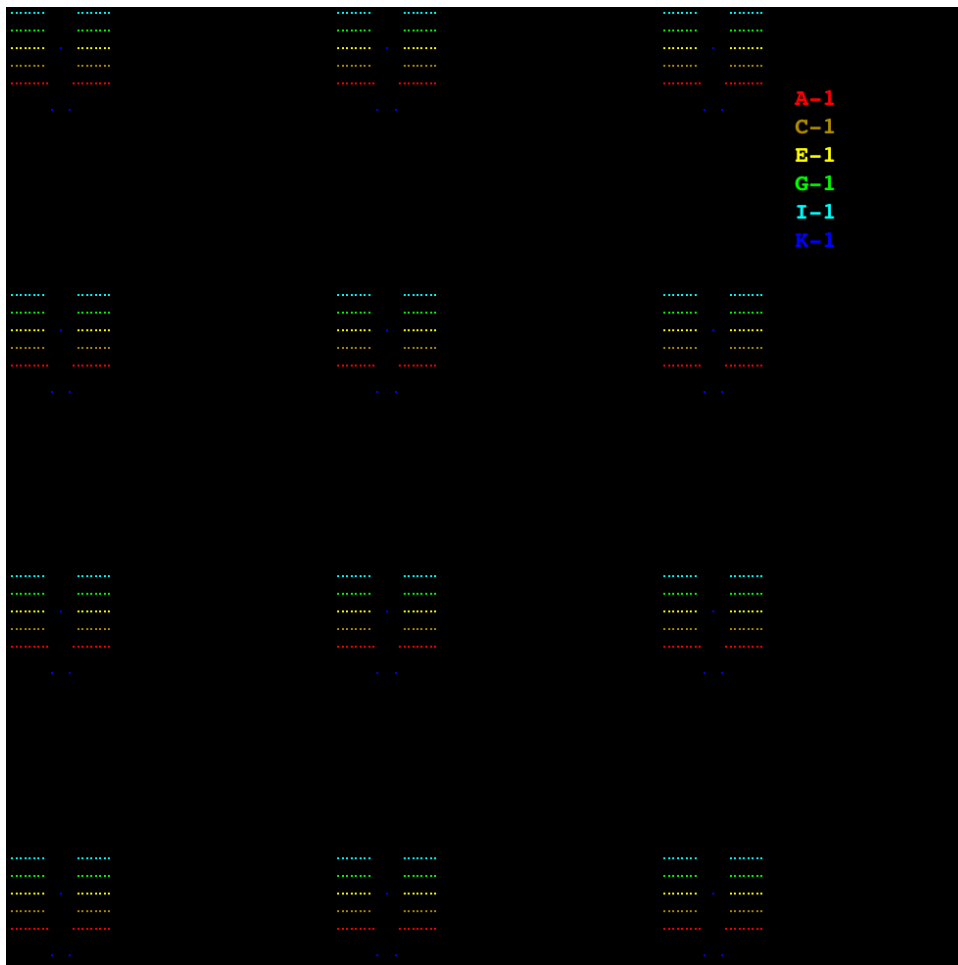
Processing the GAL File

Reading the Gene Array Layout (GAL) File

In order to automate the image analysis, the location of each treatment spot on a filter needs to be known. At MBARI, we use a custom text format to describe the application of spots by the piezzo electric printer. Each printer run prints a number of ESP filters on a single filter sheet. Each individual filter is subsequently cut from the filter sheet. A complete GAL file can be read using:

```
import java.io.File
import java.net.URL
import org.mbari.esp.ia.services.GeneArrayAnalysisService
import org.mbari.esp.ia.services.ToolBox
// READ GAL FILE
val geneArrayIOService = ToolBox.geneArrayIOService
val allGalPoints = geneArrayIOService.read(new URL("file:/
test07/110220hab5wcomp_2011-03-07_150545_Run.txt"))
// CREATE IMAGE
val bufferedImage1 = GeneArrayAnalysisService.toBufferedImage(allGalPoints, true, 100, 2)
val imageIOService = ToolBox.imageIOService
imageIOService.write(bufferedImage1, new File("110220hab5wcomp_2011-03-07_150545_Run.png"))
```

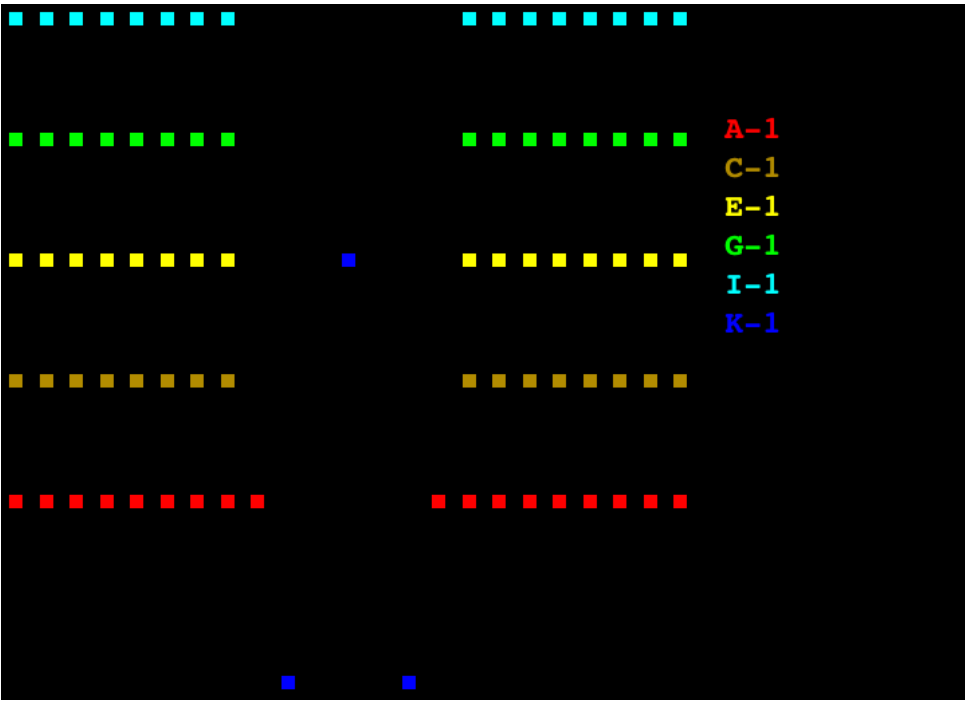
This produces the following image:



Subsetting the GAL Points

For our analysis, we only want the points that represent a single filter. In order to exclude the others we just subset the GAL points using:

```
// SUBSET - 12500 is a square in microns from the upper left corner of the GAL image
val galPoints = GeneArrayAnalysisService.filterSingleSpot(allGalPoints, 12500)
// CREATE IMAGE
val bufferedImage2 = GeneArrayAnalysisService.toBufferedImage(galPoints, true, 20, 10)
imageIOService.write(bufferedImage2, new File("110220hab5wcomp_2011-03-07_150545_Run-single.png"))
```



Extracting Image Fiducial Features

This page last changed on May 21, 2012 by [brian](#).

Extracting the Fiducial Spots from Images

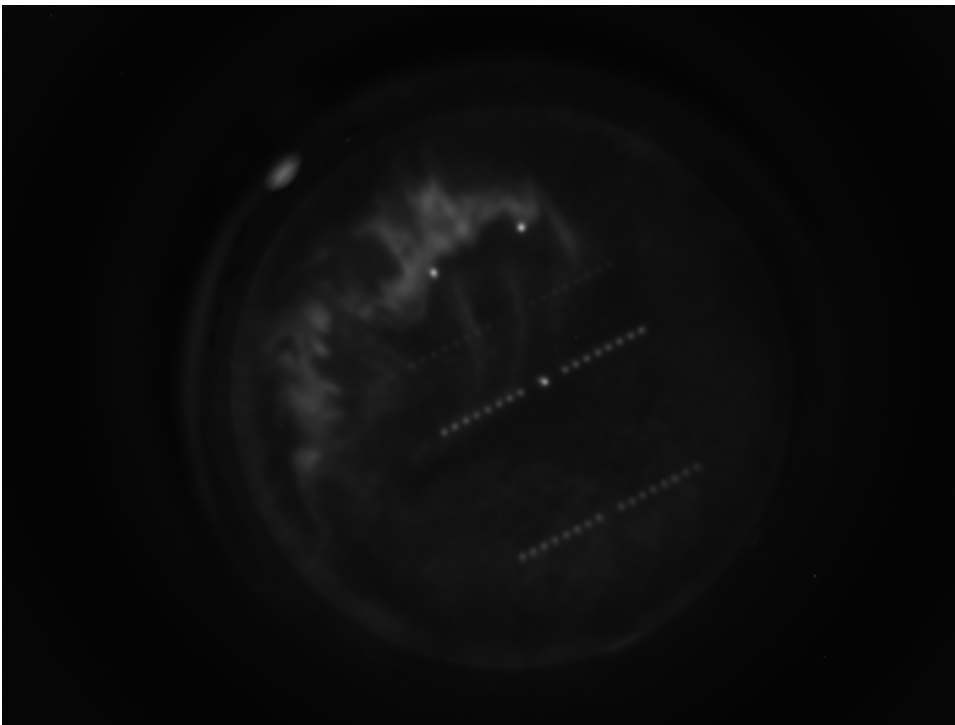


Assumptions

The technique used here assumes that the fiducial spots on the image are **very** bright compared to the rest of the image

Reading the Image

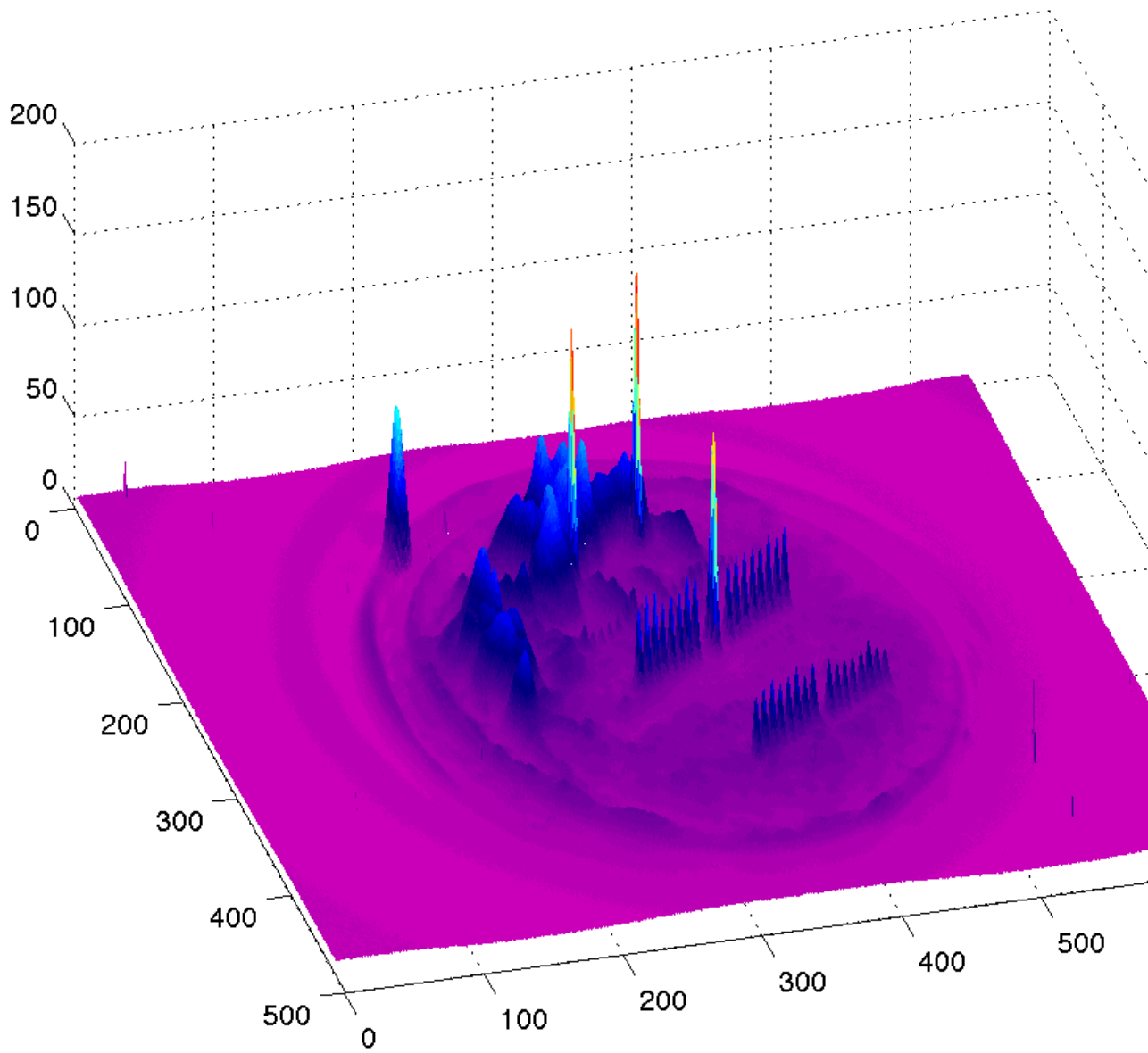
```
import java.io.File
import java.net.URL
import org.mbari.esp.ia.services.ToolBox
// READ ESP TIFF IMAGE
val io = ToolBox.imageIOService
val image = io.read(new URL("file:/test08/pcr11jun2520h2000m140s.tif")).getProcessor
// WRITE AS PNG
io.write(image, new File("pcr11jun2520h2000m140s.png"))
```



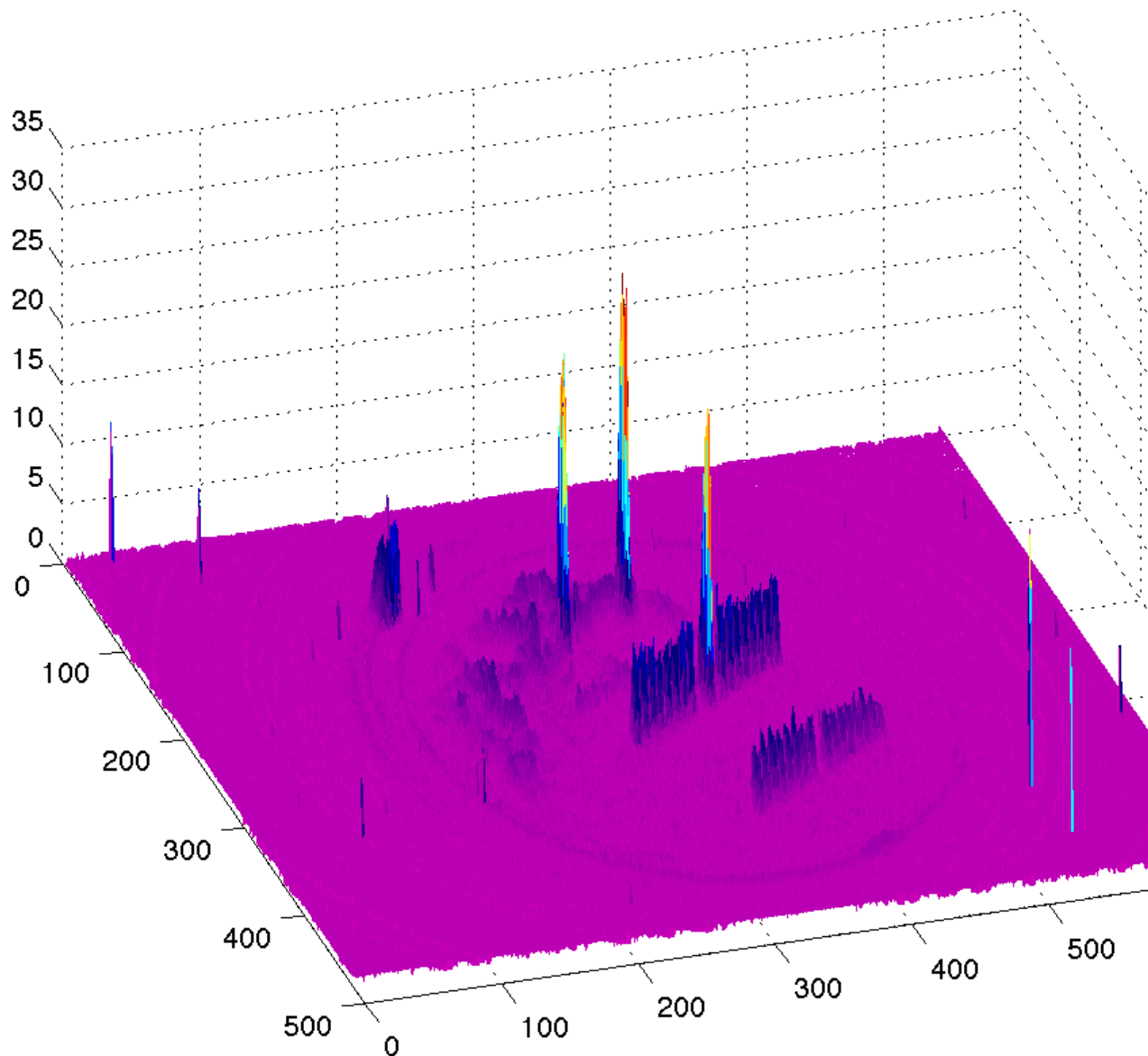
Extracting Bright Spots

The fiducials are typically the brightest areas on the image, especially in contrast to pixels immediately adjacent to the fiducial spots. We take advantage of this quality and isolate the fiducials by calculating the standard deviation of a 3x3 kernel across the entire image. The reason is clearly evident when looking at a surface plot of the raw image vs. the standard deviation. On the raw image, the fiducials may not be distinct from noisy backgrounds. However, when using the standard deviation the fiducials sharply contrast with the rest of the image. In the images below, the 3 brightest peaks are the fiducial spots on the image.

Raw Image



Standard Deviation of 3x3 Kernel



We can extract the bright regions with the following code:

```
import org.mbari.esp.ia.imglib.BrightSpotExtractorFn
val regions = BrightSpotExtractorFn(rawImage)
```

i The internals of this function use a very standard pattern for spot extraction. The steps boil down to:

1. Convert the image to 8-bit Gray so that we can calculate the histogram very quickly.
2. Threshold the image using *maximum entropy*. *Renyi's entropy* also works well but takes longer to calculate.
3. Convert the binary threshold image to 16-bit **before** flood filling. Sometimes there is more than 256 regions, which can not be represented in an 8-bit image.
4. Remove the area outside of a central circle. In general, we use a circle radius of 75% of the minimum radius of an image.

5. Flood fill the image. Regions with less than 5 pixels are considered to be noise and are ignored.

Here's the function in its entirety:

```
package org.mbari.esp.ia.imglib

import ij.process.ImageProcessor
import org.mbari.esp.ia.awt.ShortRegion

object BrightSpotExtractorFn extends (ImageProcessor => Iterable[ShortRegion]) {

  def apply(from: ImageProcessor): Iterable[ShortRegion] = {
    // Calculate local standard deviation for every 3x3 block of pixels
    val to = StdFn(from)

    val threshold = To8BitGrayFn andThen MaximumEntropyThresholdFn
    val floodFill = {
      val floodFillWMinFn = FloodFillWithMinimumFn(5, _: ImageProcessor)
      val removeFilterFn = RemoveNonFilterAreaFn(0.75, _: ImageProcessor)
      To16BitGrayFn andThen removeFilterFn andThen floodFillWMinFn
    }
    val fill = threshold andThen floodFill

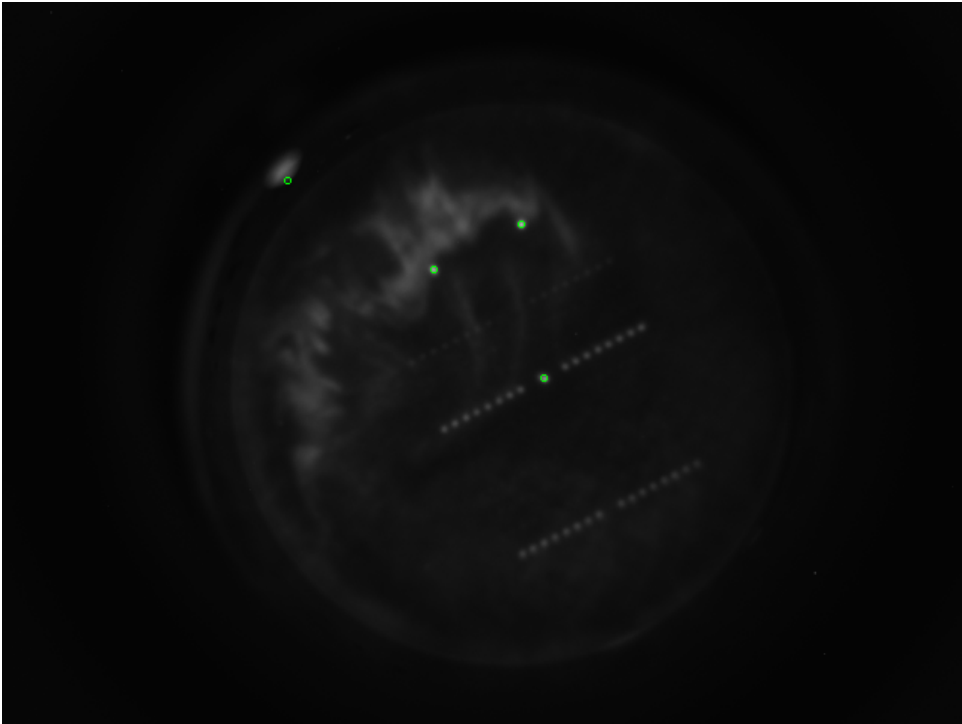
    SpotRegionsFn(from, fill(to))
  }
}
```

Then draw the image as follows:

```
import java.io.File
import java.awt.{Color, Graphics2D}
import java.awt.geom.{Ellipse2D}
import java.awt.image.BufferedImage
import org.mbari.esp.ia.imglib.ToRGBFn

val points = regions.map(_.centroid)
val circles = points.map(p => new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))

val colorImage = ToRGBFn(image).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
g2.setPaint(Color.GREEN)
circles.foreach(g2.draw(_))
io.write(colorImage, new File("pcr11jun2520h2000m140s-with-extracted-fiducials.png"))
g2.dispose()
```



Extracting Image Point Features

This page last changed on May 21, 2012 by [brian](#).

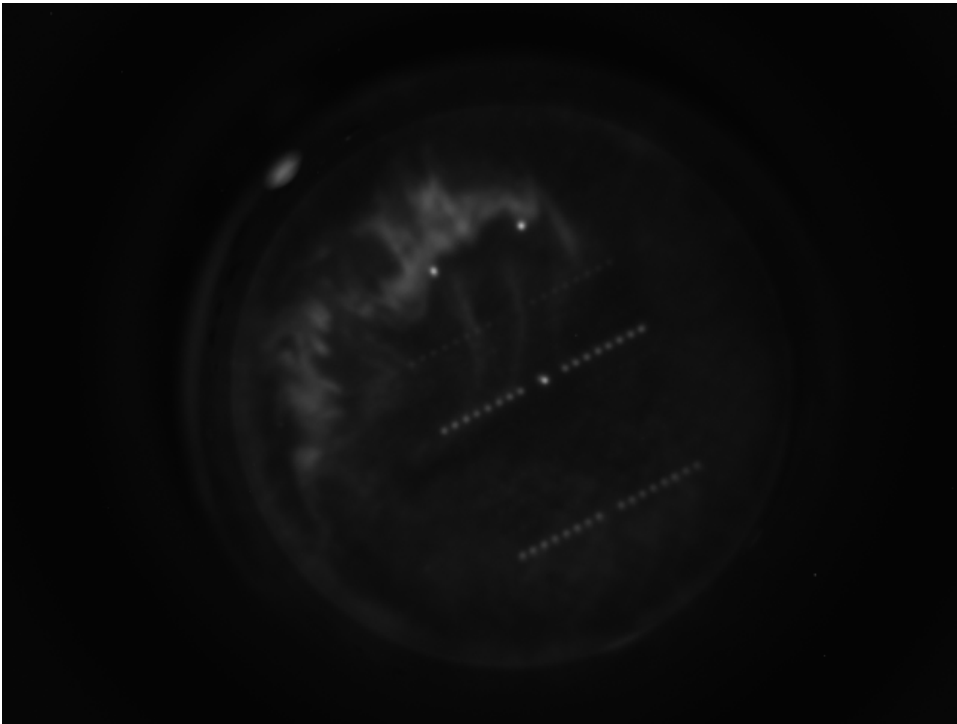
Extracting *Spots* from ESP Images

The spots extracted from the image are used to calculate the fitness of the match between the GAL file and image file.

The Short Version

The first step is to read the raw tiff image:

```
import java.io.File
import java.net.URL
import org.mbari.esp.ia.services.ToolBox
// READ ESP TIFF IMAGE
val io = ToolBox.imageIOService
val image = io.read(new URL("file:/test08/pcr11jun2520h2000m140s.tif")).getProcessor
// WRITE AS PNG
io.write(image, new File("pcr11jun2520h2000m140s.png"))
```



There is a small function call that extracts the image spots.

```
import org.mbari.esp.ia.imglib.MultiPassRegionsExtractorFn
val regions = MultiPassRegionsExtractorFn(image)
val points = regions.map(_.centroid).toSeq
```

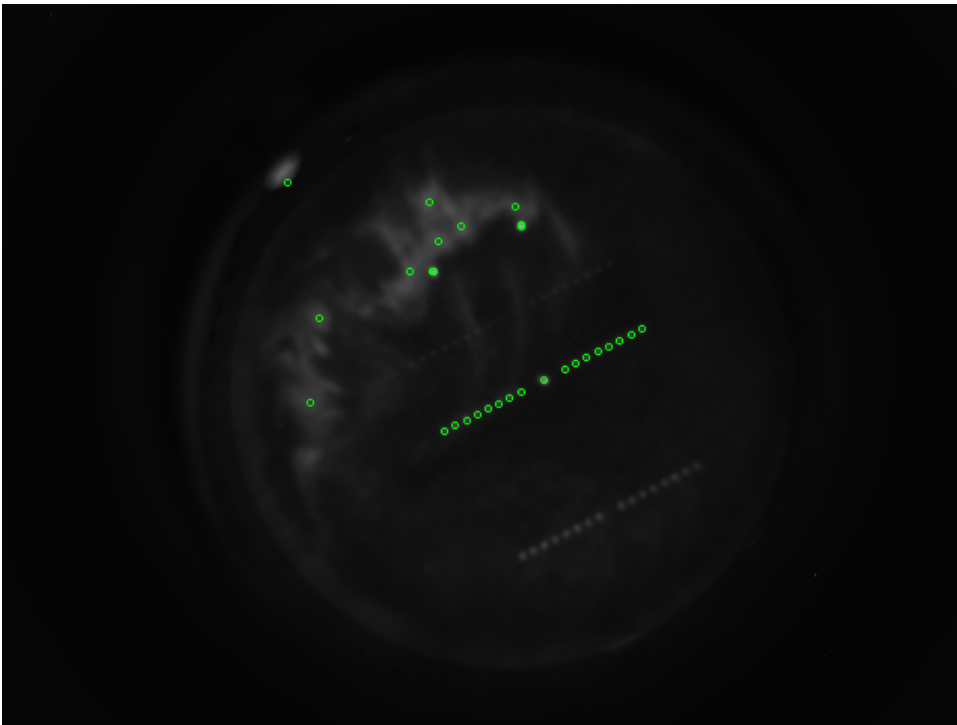
The above code snippet does the following:

1. Extracts the bright regions of the image that are most likely to represent spots of interest.
 - A region is just a collection of pixels that form a contiguous bright region
2. `regions.map(_.centroid).toSeq` Converts each region to a point by calculating the centroid of the region. The collection of points is then converted to a Seq which is roughly equivalent to a `java.util.List`

We can draw the extracted points onto the image using this bit of code:

```
import java.io.File
import java.awt.{Color, Graphics2D}
import java.awt.geom.{Ellipse2D}
import java.awt.image.BufferedImage
import org.mbari.esp.ia.imglib.ToRGBFn

val colorImage = ToRGBFn(image).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
val circles = points.map(p =>
  new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))
g2.setPaint(Color.GREEN)
circles.foreach(g2.draw(_))
io.write(colorImage, new File("pcr11jun2520h2000m140ss-with-extracted-spots.png"))
g2.dispose()
```



Under the Hood

In order to extract the regions that represent the spots we threshold at multiple levels using 2 different image treatments. The 2 image treatments are:

1. Raw (no treatment)
2. Standard deviation of image using a local 3x3 kernel.

We calculate a base threshold for each treatment using *maximum entropy*. Then we make multiple passes across the image from using the following:

```
val bound = 25 // Add and subtract this from threshold to get range
val minVal = if (split - bound < 0) split else split - bound
val maxVal = if (split + bound > 255) split else split + bound
for (i <- minVal to maxVal by 5) {
  // Process image. ie. apply threshold and floodfill
}
```

For each pass across an image, we aggregate all the regions into a collection. During the aggregations we eliminate spurious or duplicate regions by:

1. Exclude non-round regions. That is, it excludes regions that have odd shapes or ellipses as they are not likely to be spots of interest (e.g. `filter(_.eccentricity()._1 < 3)`)

2. Exclude regions that contain less than 10 pixels.
3. Exclude regions whose centroid duplicates an existing accepted region. (i.e. $c1.x == c2.x \ \&\& \ c1.y == c2.y$)
4. Drop regions whose centroid is within 3 pixels of another region. These are likely to be regions that represent the same spot.

[Extracting Image Point Features 2](#)

Extracting Image Point Features 2

This page last changed on May 17, 2012 by [brian](#).



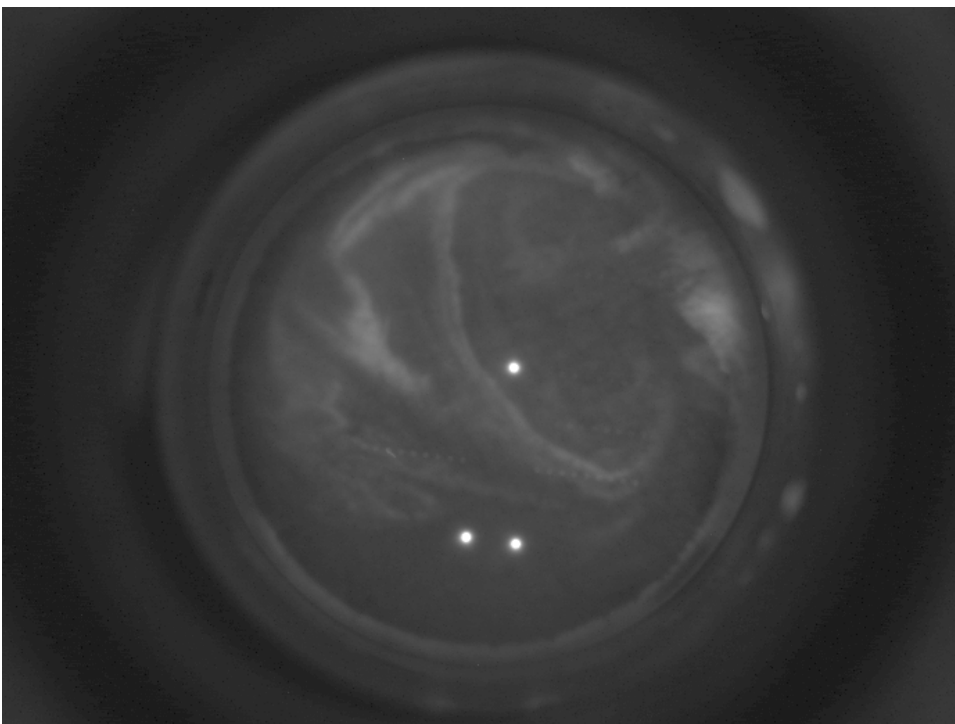
This page is deprecated and this technique is no longer used. We're retaining this page for archival purposes

Extracting *Spots* from ESP Images

The BIG Picture

The first step is to read the raw tiff image:

```
import java.io.File
import java.net.URL
import org.mbari.esp.ia.services.ToolBox
// READ ESP TIFF IMAGE
val imageIOService = ToolBox.imageIOService
val rawImage = imageIOService.read(new URL("file:/test07/hab11may0514h2000ml40s.tif")).getProcessor
// WRITE AS PNG
imageIOService.write(rawImage, new File("hab11may0514h2000ml40s.png"))
```



There is a small function call that extracts the image spots. Behind the scenes it does **a lot** of things. I'll start with the *big picture* then we'll dive into the internals of how spots are extracted.

```
import org.mbari.esp.ia.imglib.SpotRegionsExtractorFn
val spotRegions = SpotRegionsExtractorFn(rawImage).filter(_.eccentricity()._1 < 3)
val imagePoints = spotRegions.map(_.centroid.toInt).toSeq
```

The above code snippet does the following:

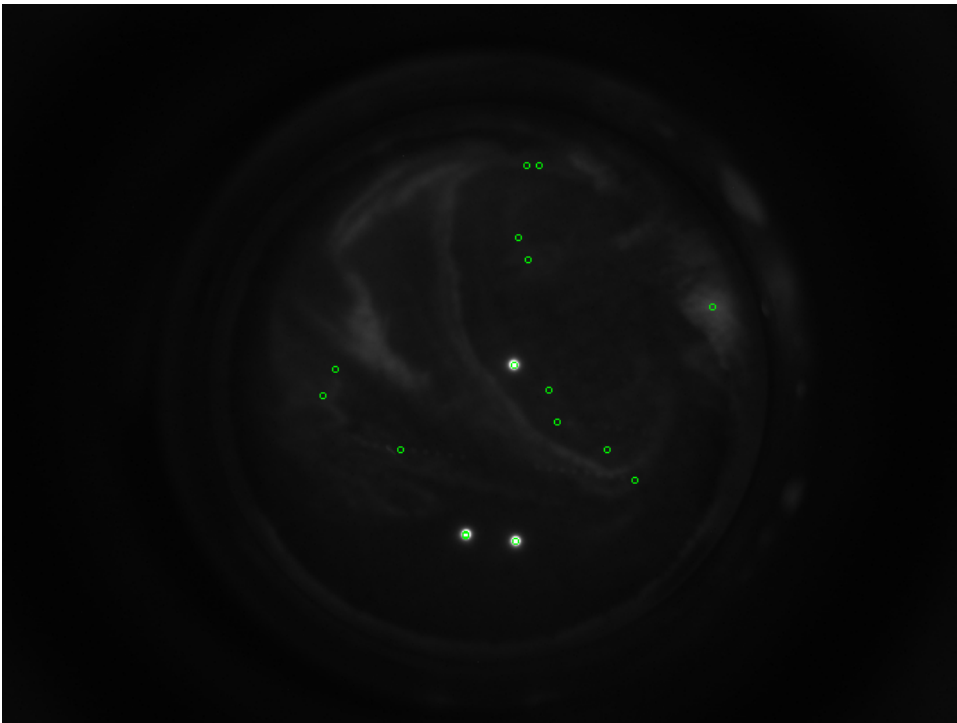
1. Extracts bright regions of the image that are most likely to represent spots of interest.
 - A region is just a collection of pixels that form a contiguous bright region
2. `filter(_.eccentricity()._1 < 3)` : This snippet excludes the least round spots. That is, it excludes regions that have odd shapes or ellipses as they are not likely to be spots of interest

3. `spotRegions.map(_.centroid.toInt).toSeq` Converts each region to a point by calculating the centroid of the region. The collection of regions is converted to a Seq which is roughly equivalent to a `java.util.List`

We can draw the extracted points onto the image using this bit of code:

```
import java.io.File
import java.awt.{Color, Graphics2D}
import java.awt.geom.{Ellipse2D}
import java.awt.image.BufferedImage
import org.mbari.esp.ia.imglib.ToRGBFn

val colorImage = ToRGBFn(rawImage).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
val extractedPoints = imagePoints.map(p =>
  new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))
g2.setPaint(Color.GREEN)
extractedPoints.foreach(g2.draw(_))
imageIOService.write(colorImage, new File("hab11may0514h2000ml40s-with-extracted-spots.png"))
g2.dispose()
```



Under the Hood

So for simplicity, we would normally use a simple call to `SpotRegionsExtractorFn` to get the spots. Here's what's going on under the hood:

1. Apply a contrast function
 - We make multiple passes over the `rawImage` applying different contrast treatments. Each treatment allows us to resolve different spots. We will walk through each treatment below.
2. Threshold the image
 - This converts an image into a binary image of background (dark) areas and foreground (or bright) spots.
3. Flood fill the image
 - The flood fill applies a unique id to each contiguous foreground region. This is how we id each spot.
4. Extract the spot regions

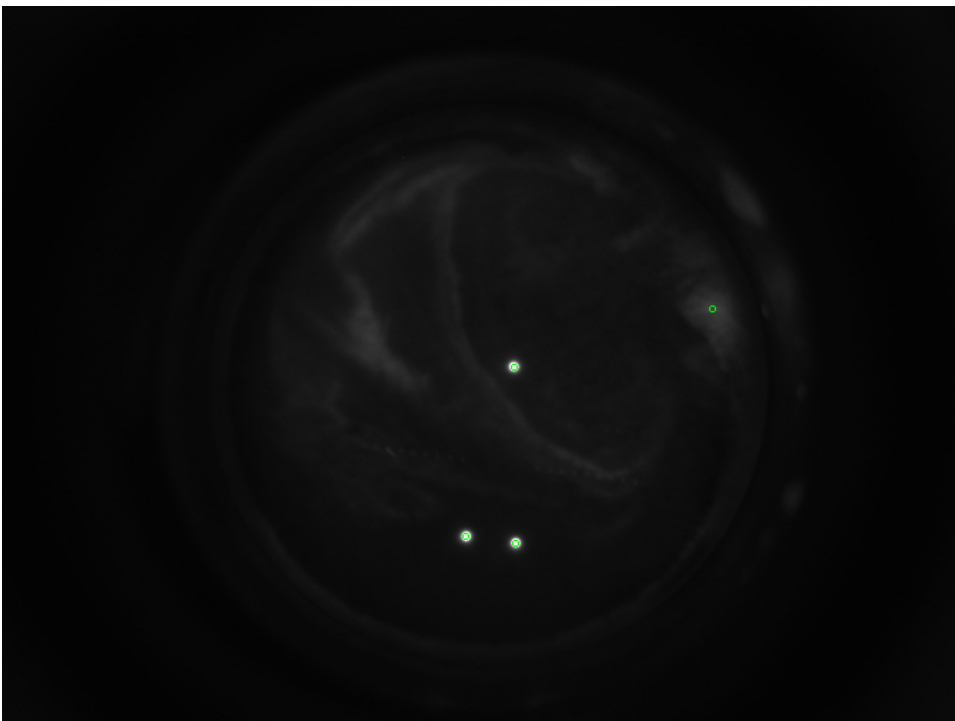
First Pass: Raw Image

```
import ij.process.ImageProcessor
import org.mbari.esp.ia.imglib.FloodFillWithMinimumFn
import org.mbari.esp.ia.imglib.MaximumEntropyThresholdFn
import org.mbari.esp.ia.imglib.RemoveNonFilterAreaFn
import org.mbari.esp.ia.imglib.SpotRegionsFn
import org.mbari.esp.ia.imglib.To16BitGrayFn
import org.mbari.esp.ia.imglib.To8BitGrayFn

// SETUP IMAGE PROCESSING FUNCTIONS
val threshold = To8BitGrayFn andThen MaximumEntropyThresholdFn
val floodFill = {
  val floodFillWMinFn = FloodFillWithMinimumFn(5, _: ImageProcessor)
  val removeFilterFn = RemoveNonFilterAreaFn(0.75, _: ImageProcessor)
  To16BitGrayFn andThen removeFilterFn andThen floodFillWMinFn
}

// SPOT EXTRACTION OF RAW IMAGE
val rawFloodFill = threshold andThen floodFill
val rawRegions = SpotRegionsFn(rawImage, rawFloodFill(rawImage)).filter(_.eccentricity()._1 < 3)
val rawPoints = rawRegions.map(_.centroid.toInt).toSeq

// CREATE IMAGE
val colorImage = ToRGBFn(rawImage).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
val extractedPoints = rawPoints.map(p =>
  new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))
g2.setPaint(Color.GREEN)
extractedPoints.foreach(g2.draw(_))
imageIOService.write(colorImage, new File("hab11may0514h2000ml40s-with-extracted-raw-spots.png"))
g2.dispose()
```

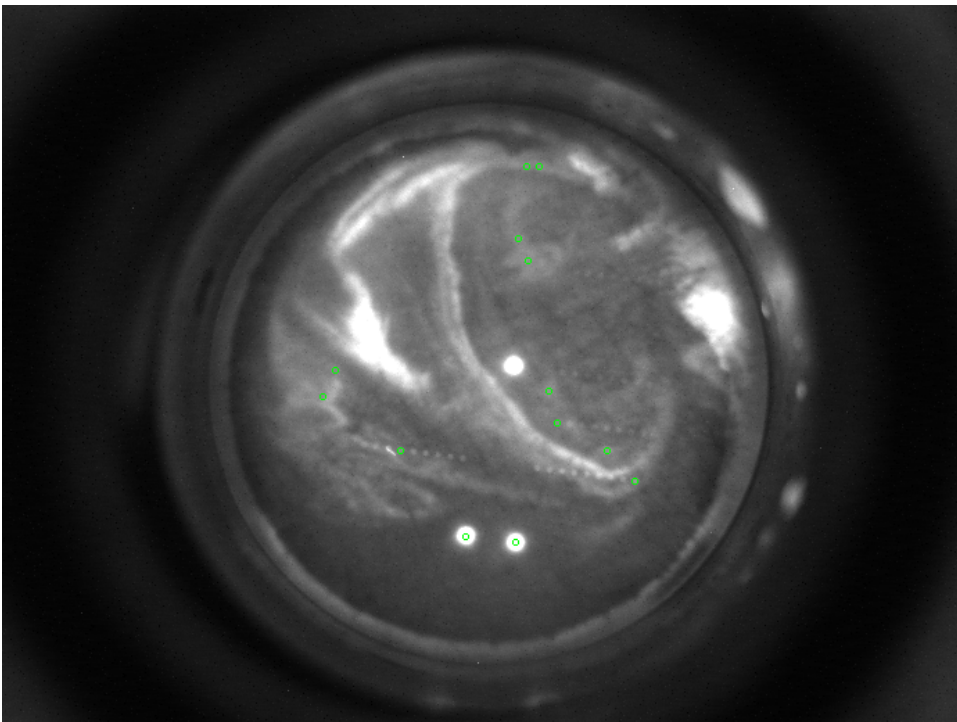


Second Pass: Autocontrasted Image

```
import org.mbari.esp.ia.imglib.AutoContrastFn
```

```
// SPOT EXTRACTION OF AUTOCONTRASTED IMAGE
val autoContrastFn = new AutoContrastFn(0.95)
val acImage = autoContrastFn(rawImage)
val acRegions = SpotRegionsFn(rawImage, rawFloodFill(acImage)).filter(_.eccentricity()._1 < 3)
val acPoints = acRegions.map(_.centroid.toInt).toSeq

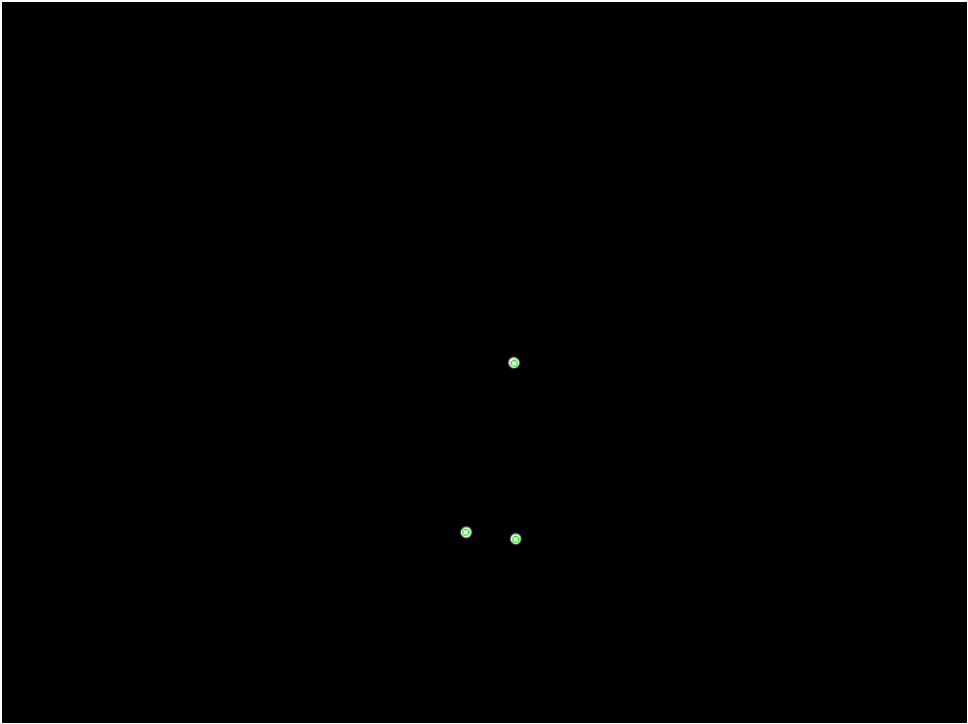
// CREATE IMAGE
val colorImage = ToRGBFn(acImage).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
val extractedPoints = acPoints.map(p =>
  new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))
g2.setPaint(Color.GREEN)
extractedPoints.foreach(g2.draw(_))
imageIOService.write(colorImage, new File("hab11may0514h2000ml40s-with-extracted-ac-spots.png"))
g2.dispose()
```



Third Pass: Dynamic Contrast (Fuzzy-Sets)

```
import org.mbari.espi.ia.imglib.FuzzyContrastFn
val fuzzyContrastFn = To16BitGrayFn andThen FuzzyContrastFn
val fcImage = fuzzyContrastFn(rawImage)
val fcRegions = SpotRegionsFn(rawImage, rawFloodFill(fcImage)).filter(_.eccentricity()._1 < 3)
val fcPoints = fcRegions.map(_.centroid.toInt).toSeq

// CREATE IMAGE
val colorImage = ToRGBFn(fcImage).getBufferedImage
val g2 = colorImage.getGraphics.asInstanceOf[Graphics2D]
val extractedPoints = fcPoints.map(p =>
  new Ellipse2D.Double(p.x - 2, p.y - 2, 4, 4))
g2.setPaint(Color.GREEN)
extractedPoints.foreach(g2.draw(_))
imageIOService.write(colorImage, new File("hab11may0514h2000ml40s-with-extracted-fc-spots.png"))
g2.dispose()
```



Point Feature Alignment

This page last changed on May 21, 2012 by [brian](#).

Overview

Once the points of interest are extracted from both the GAL file and image our next goal is to align the GAL points to those on the image. The basic algorithm works as follows:

The Alignment Algorithm

The Basics

The basic building block of algorithm is a *chromosome*. Our chromosome encodes information that represents 3 points, where a point is an x, y pair in image pixel coordinates. Only two points are used, but the 3rd point would be useful if we ever need to run an affine transform instead of a linear transform. An individual chromosome is created as follows:

```
import org.mbari.esp.ia.geometry.Point2D
import org.mbari.esp.ia.ga.PointChromosome

val p0 = Point2D(10, 10)
val p1 = Point2D(20, 20)
val p2 = Point2D(30, 30)
val chromosome = PointChromosome(p0, p1, p2)
```

Why use a chromosome to represent the points? Originally, feature alignment was done using a genetic algorithm, but it's been refined so that we now use some considerably less complex.

The goal of our feature alignment is to find a non-rigid transform that rotates, scales and translates the gal points in euclidean space to align with point features extracted from the image. The recipe for this has several steps:

1. [Read the GAL file and extract points for a single filter](#)
2. Extract the fiducial points from the single filter's gal points.
3. [Read an ESP image and extract the bright fiducial spots](#)
4. [Read an ESP image and extract all spot features](#).
5. Run through all the possible permutations of aligning the gal points to the image fiducial points
 - a. Calculate the fitness for each permutation
 - b. Select the *fittest* alignment.

The basic goal of the genetic algorithm is to take 2 points from the GAL and match them to the corresponding 2 points on the image. To achieve this we do the following:

1. Calculate the [linear transform](#) needed to rotate, scale, and align the GAL to the image and apply this to all the points in the GAL file.
2. Calculate a fitness for the match between the image and GAL points. This fitness is actually a multipart evaluation
 - a. First check that all the transformed GAL points are within the bounds of the image. If they are not we evaluate this match as *unfit*.
 - b. Second, we check that the GAL points have not collapsed by calculating the most common distance between nearest neighbors. Then we check to see that this distance less than the maximum distance between image point pairs and greater than the minimum distance between point pairs.
 - c. Finally, we use a weighted distance function. This calculates
 - i. the distance between all image points and all gal points.
 - ii. Selects the GAL point nearest each image point.
 - iii. Takes the *distance* parameter (we're using 7 pixels) and if the GAL-Image point distance is less than our distance param, we use the following

```
f = fitness
d = maximum distance [provided by user]
n = number of image points
```

d_n = distance from image point to nearest GAL point

$$f = \frac{\sum_1^n d - d_n}{nd}$$

ESP Logos

This page last changed on Mar 09, 2011 by [jbirch](#).



Here is the Logo:

Below are some high-resolutions formats you may like:

[B&W .PDF](#)

[B&W .TIFF](#)

[Color .PDF](#)

[Color .TIFF](#)

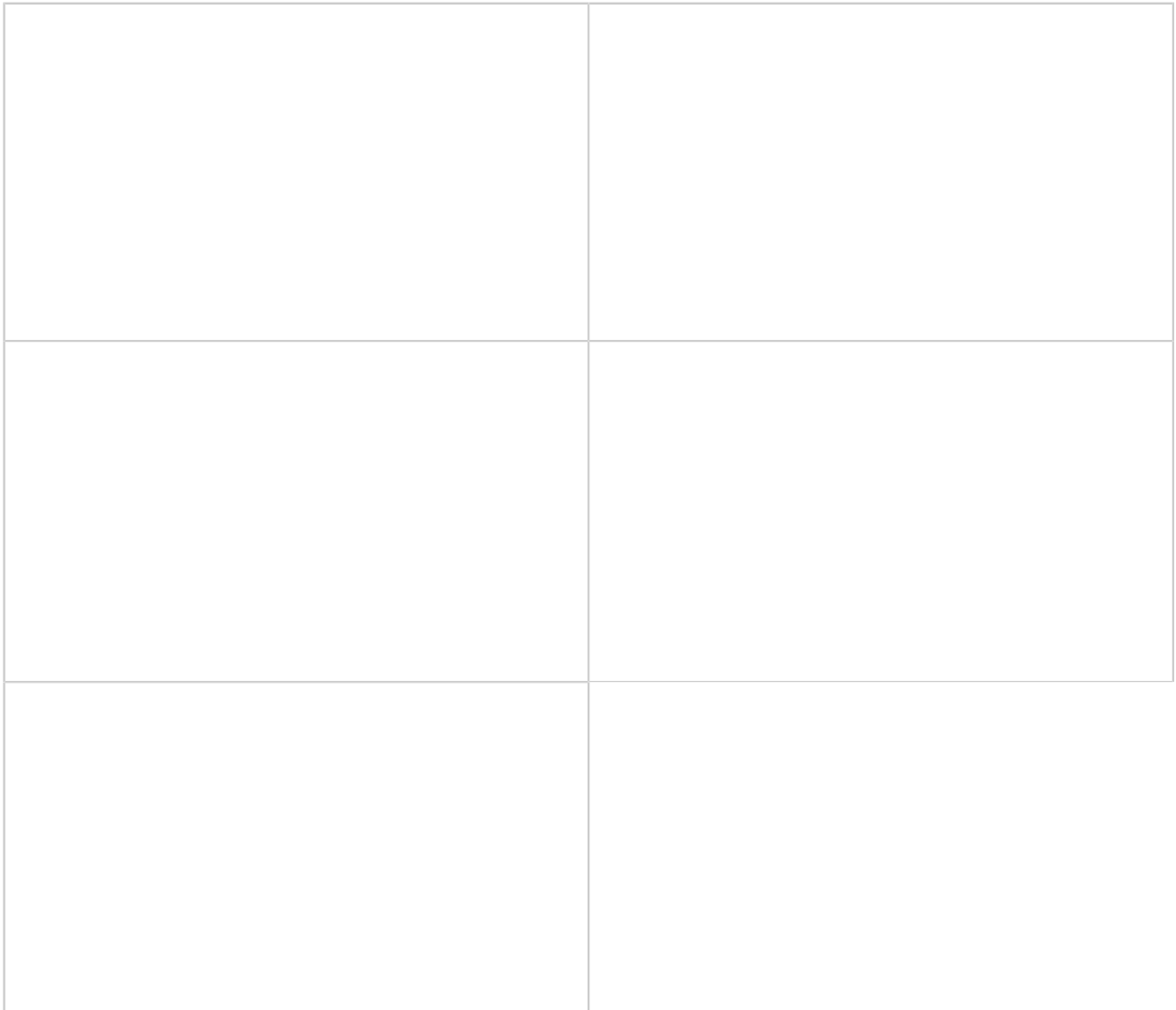
There are other formats attached to this page (go to the attachment tab above and download directly)

ESP Servo Simulation

This page last changed on Apr 29, 2014 by [carueda](#).

These are some notes about the servo model design and implementation.

Here are some of the plots generated from the unit tests:



Design in a nutshell

At time of writing the code resides in the 'servomodel' branch:

<https://github.com/MBARI-ESP/ESP2Gscript/tree/servomodel>

The main source file, where the `I2C::Servo::Model` class is defined is: [servomodel.rb](#).

The servo simulation is modularized in a layered way. Elements of the modeling itself are under the `ServoModeling` module:

- `Servo::Model` and related elements are only concerned, in terms of the characterization of the velocity-position function, with `ServoChannelSimulator`.
- `ServoChannelSimulator` makes use of a `FunctionFactory` to keep and adjust the overall velocity-position function according to move commands.

- FunctionFactory facilitates the construction of Function's.
- Possible Function's are:
 - ConstantFunction: function always evaluating to [0, pos] for a given position
 - MonotoneFunction: captures the basic velocity profile of starting at a given velocity, and then going through acceleration, plateau (each of which can be of zero duration), and deceleration zones. Starting at a given initial position, this function changes the position monotonically in a given direction.
 - CompositeFunction: function composed of the concatenation of multiple functions, each applied from a specific time wrt the previous one.

Testing

Unit tests

All unit tests can be run at the command line as follows:

```
$ find test/lib/i2c/model -name \*_test.rb -exec ruby -I. -Ilib -Iutils -Itest/lib {} \;
Loaded suite test/lib/i2c/model/servo/function_test
Started
.....
Finished in 0.013645 seconds.

10 tests, 607 assertions, 0 failures, 0 errors
Loaded suite test/lib/i2c/model/servo/functionfact_test
Started
.....
Finished in 0.029115 seconds.

10 tests, 1068 assertions, 0 failures, 0 errors
Loaded suite test/lib/i2c/model/servo/servochannelsim_test
Started
.....
Finished in 0.08877 seconds.

7 tests, 2531 assertions, 0 failures, 0 errors
Loaded suite test/lib/i2c/model/servomodel_test
Started
.....
Finished in 0.188708 seconds.

7 tests, 184 assertions, 0 failures, 0 errors
```

Test with actual integration in the framework

The following tested in both simfast and simreal modes:

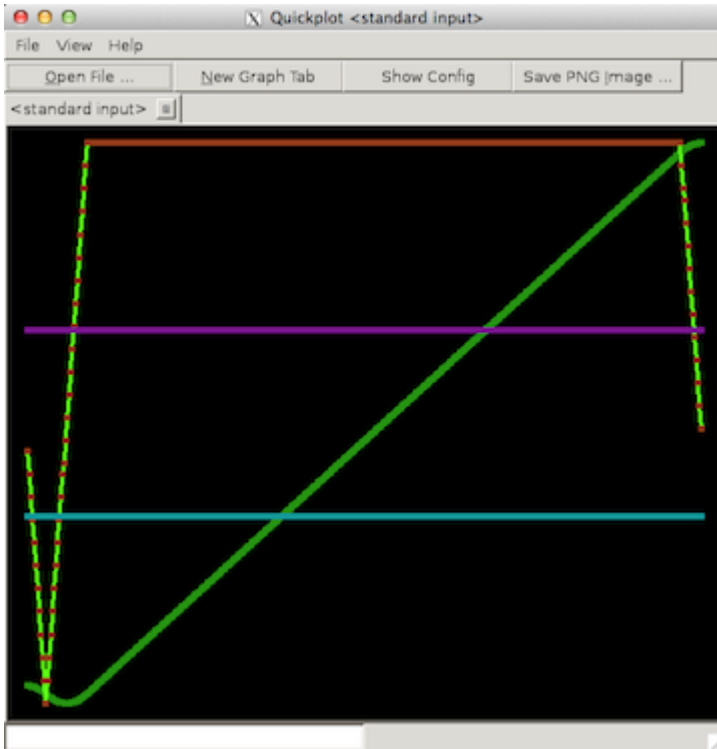
```
carueda@bufflehead:~/esp2$ . bin/ESPenvironment shallow moe
carueda@bufflehead:~/esp2$ ESPmode=simfast
carueda@bufflehead:~/esp2$ esp
ESPmoe:001:0-> require 'plot'
true
ESPmoe:002:0-> ssLog = SS.log {SS.home.empty; SS.fill}
SS.reconfigure SSconfig
SS.home.seek empty
@16:00:00.82 SS.seek 25.00ml
[<I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false, lost=false,
home=false, position=-12, velocity=-12, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>,
...
```

```

<I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false, lost=false,
home=false, position=108084, velocity=12, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>,
<I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false, lost=false,
home=false, position=108096, velocity=0, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>]
ESPmoe:003:0-> plot ssLog
#<Thread::PLOT_1 priority=1 sleep>
ESPmoe:004:0->

```

The generated plot:



Some other commands:

```

@09:23:13.98 -> SS.status
#<struct I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false,
lost=false, home=false, position=108096, velocity=0, current=0, pwm=0, err=0, inPress=0,
outPress=0, deltaPress=0, voltage=12.1620363279332>
@09:23:18.32 -> SS.goal

@09:23:25.46 -> SS.getConfig
#<struct I2C::Servo::Configuration samplePeriod=1, encoder=:negative, threshold=:off,
home=:negative, jogHome=false, homeDirection=false, thresholdOffset=0, maxPositionErr=1000,
stopWindow=6, gain=#<struct PIDgain P=400, I=12000, D=1000>, acceleration=6, deceleration=0,
stopRate=0, maxSpeed=150, minSpeed=15, maxPWM=98, minPWM=-98, maxSettling=64, maxCurrent=600,
stiction=5, friction=60, hunt=true, brake=true, maxDeltaPress=false, maxInPress=0, maxOutPress=0,
minDeltaPress=false, minInPress=0, minOutPress=0, pressBias=0, pressGain=0, inputDeltaPress=false,
externalCurrent=false, debug=false>

@09:24:30.19 -> SS.setPosition! 2
SS.setPosition! 2.00ml
Sampler Syringe at 2.00ml
@09:24:35.31 -> SS.status
#<struct I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false,
lost=false, home=false, position=5472, velocity=0, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>

@09:25:03.46 -> SS.jog -3000
SS.jog -3000

```

Sampler Syringe at 1.33ml

@09:25:29.29 -> SS.status

```
#<struct I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false,
lost=false, home=false, position=2472, velocity=0, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>
```

@09:25:50.72 -> SS.to 5

@09:25:50.73 SS.seek 5.00ml

Sampler Syringe at 5.00ml

@09:25:54.42 -> SS.status

```
#<struct I2C::Servo::Status enabled=false, pastRLS=false, pastFLS=false, pastThreshold=false,
lost=false, home=false, position=18858, velocity=0, current=0, pwm=0, err=0, inPress=0, outPress=0,
deltaPress=0, voltage=12.1620363279332>
```

ESP surface mooring bouyance

This page last changed on Dec 01, 2011 by [sjensen](#).

Mooring configuration:

2 dry battery packs

1 CTD

no ISUS

1 MaCK with MFB and some reagents

1 Mooring base

ESP in Air Weight: 680 lb

ESP and Anchor in Air : 1156 lb

ESP in air Anchor in water: 1092

ESP and Anchor in water: 202 lb

Anchor weight in water = $1092 - 680 = 412$ lb

ESP bouyance = $202\text{lb} - 680 - 412 = -890$ lb

Total Bouyance = $680 - 890 = 210$ lb

Frit Identification system

This page last changed on Jan 08, 2010 by [jbirch](#).

Our first 'labeled' scintered frits arrived

23 April, 2008. These were 10um frits, labeled 'D'. Specifics of this order:

Job #36366
Disc Dimensions: 0.998 +0.000/-0.002" OD x 0.062 +/-0.005" thick
Porous Grade: 10 Micron Grade
No Chamfers
Porous material Chemistry: Titanium Grade 2 per unified
PO# 0810358

These frits did **NOT** have finished edges, and were 0.057" in thickness, within tolerance specified, but thinner than original frits.
Future orders should specify edging and a lower thickness tolerance to get closer to the 0.062" thickness.

The convention, decided in emails Feb 26, 2008, will be:

0.1, 0.5, 1, 10um frits will be labeled

A, B, C, D respectively.

We have had CE Metallurgical make the 'press' for these so subsequent batches should be less expensive.

March 26, 2009

Jobs #38015, 38016, 38017
Disc Dimensions: 0.998 +0.000/-0.002 OD x 0.063 +/-0.003" thick (note slightly thicker with narrower tolerance than first order)
PO# 0910403

0.1 um (labeled 'A') \$10.25/ea
20.0 um (labeled 'E') \$7.55/ea
50.0 um (labeled 'F') \$7.55/ea

Ordered 100 of each size.

December 30, 2009

Placed the following order:

Jobs
Disc Dimensions: 0.998 +0.000/-0.002 OD x 0.063 +/-0.003" thick
PO

0.2 um (100; labeled '2') \$10.25/ea
0.5 um (100; labeled 'B') \$10.25/ea
1.0 um (100; labeled 'C') \$10.25/ea
10 um (300; labeled 'D') \$5.85/ea

Contact:

Chand Eisenmann Metallurgical
258 Spielman Hwy
Burlington, CT 06013

860-675-5000

email:
me@chandeisenmann.com (Mark Eisenmann)

Functional Requirements for G3 ESP

This page last changed on Sep 21, 2011 by [jbirch](#).

Below are links to attached Word Documents

1. [Spring 2010](#)
2. [Nov 11, 2010](#)
3. [Sep 15, 2011](#)
4. [Sep 21, 2011](#) updated after 9-21-2011 group meeting.

Functional Requirements for Gen 3 ESP

This page last changed on Jul 22, 2009 by [kgomes](#).

ESP team, please add to the questions:

- What will be the typical length of deployment for the Gen 3 instrument (G3)?
- What is the overall energy budget?
- Do we need our own power source or use the AUV?
- What size will the G3 be designed for? LRAUV size, El Dorado size, or something else?
- Maximum Depth
- Maximum Sampling Depth?
- What is the main function of the G3 instrument? Front end water processing, creating a lysate for back-end analysis? Or will the G3 do more than that? What?
- If simply water processing:
 - how much water will be filtered?
 - What will be the filtering system? pucks? modified pucks? scintered frits? something else?
 - what lysate volume do you want to create?
 - Will archival be necessary?
- If G3 runs assays, how many assays/tests will it be running? Frequency?
- Reusable assay's?
- How will decon occur?

LRAUV Payload Specs:

- 300m design depth
- Typical payload size: ~11.5" dia, 12" long
- Maximum payload size ~11.5" dia, 24" long
- Must be neutrally bouyant
- Must include pressure housings and buoyancy (if needed)
- AUV power may be used, with reduced range/duration.

Software questions:

- What will be the information (commands) required from the AUV? For example, will the samples be fired by geolocation, by data from ancillary sensors, by time, etc.? Depending on how the ESP is to conduct it's mission, it may need changes to AUV payload (contextual sensors, specific commands where the AUV can tell the ESP to fire, etc.).

This page last changed on Dec 03, 2013 by [pargett](#).

Welcome to the G3 ESP and LRAUV Integration Page

Interface Control Documents

[3G-LRAUV ICD ver1-0.doc](#)[]

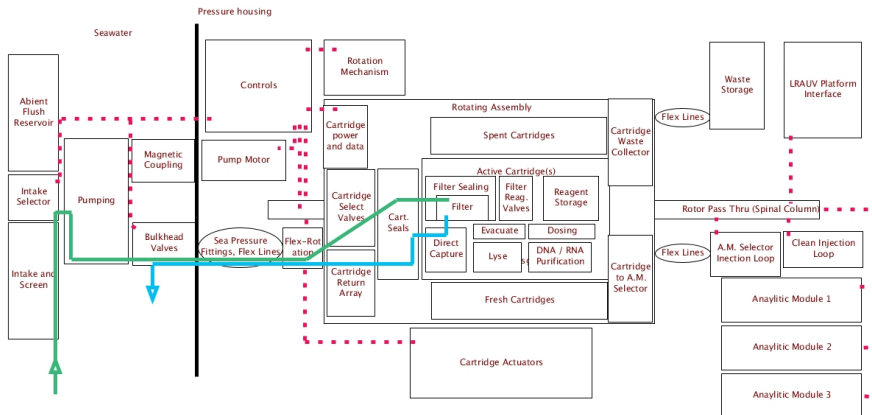
[Mission State Diagram](#)

Mission State Diagram

This page last changed on Dec 09, 2013 by [bkieft](#).

G3 -Turbine- Technical Options

This page last changed on Oct 08, 2012 by [pargett](#).



	G3 Function	Requirements	Technologies / Development needs	Manufacturers/ Collaborators	Score*
1	Ambient Flush Reservoir	- Mixtures, chemicals? - Volume (s) - Material compatibility - Dilution with SW? - Flush fluids as well?			1
2	Intake point and Screen	- Single intake? - CU screens? - Location on LRAUV - Min bore size?			2
3					
4	Intake Selector Valve Ambient Sea/ Flush	- Number of ports (intakes and ambient storage)? 3-way valve - Min bore size?	- Solenoid - oil compensated - multi port - flipper style - Rocker style		3

		• pressure neutral • 15 psid			
5	Bulkhead valves	• Isolation of seawater path • Up to 500 psi • Min bore size? • Non-corroding • Fail closed • Wattage? Power budget? • Small scale, Size: less than c-battery	• Direct lift solenoid valves • Custom body valves (thread into a SAE 4 port) • Axial flow thru valves • Turn or axial pull valves • Multi port valves • Automated actuators of above valves.		3
6	Cartridge Selection valves	• Chemical suitable • 500 psi • Min bore size? • low power • flush free	• Ladder/Looper options • 2 position spool valves • Direct lift solenoid valves • Custom body valves • 1/4 Turn • Axial pull • Automated actuators of above valves. • Multiple bank valves integrated on a manifold	• In house design, manifold w/ Axial pull spool valve 1/4 turn	4
7	Cartridge Return Array		• check valve • part of Selection valve	• LeeCo • Parker	4
8	Sea Pressure fittings/Tubing	• 500 psi • 1mm min thru • sea water and	• 1/4-28 flat bottom fittings	• Dibafit • Upchurch • LeeCo	1

		- reagent stable - vibration resistant - reliable seal	- Testing process, procedure - Vibration testing?		
9	Filter holder sealing	500 psi - sea water and reagent stable - vibration resistant - reliable seal - Seal validation prior to filtering			2
10	Filter selection valving (transition from sea to reagents)	500 psi - sea water and reagent stable - vibration resistant - reliable seal	Rotary valve, reagent select, part of filter holder		4
11	Cartridge Seals	Connection between spool valves, cartridges to cartridge			2
12					
13					
14	Filter Media	25mm dia (effective) area	- Durapore - Supore		1
15	Filter Pumping	75 psi (5 bar bubble point) - Variable speed - Max flow at least 4L/hr (@22psi) - Min flow 300mL/hr - Dosing accuracy <1% - Positive displacement	- Piston pumps - Rotating piston (Similar to DWSM) - Syringes (with or without flow valves) - Gear pumps (low expectation)		3

		(or flow measuring) • seawater suitable • Minimal shear damage to microbes. • Bidirectional (not required, but valuable) • Size (with drive mech, but not motor) < soda can	• Peristaltic (low expectation) • Progressive cavity (typically large frame) • Diaphragm • Others?		
16	Filter Evacuate	• Need to remove seawater <5% of lysis volume. • In G2, remaining seawater needs to be <100uL • For 1mL lysis volume, <50uL, or <1 drop. ◦ Test numbers: Dry filter +holder, 9.91g ◦ wet filter (filter holder dry) 9.95g (40 uL) ◦ no change if vacuumed, no change w/ single 10ml blow thru	• Air pressure evac (G2 method) • Vacuum assist below filter? • Filter holder is piston assembly, w/ small dead volumes • Displacement with other fluid?		4

		◦ after 3X 10mL blow thru, 9.92g (10 uL) ◦ filter appeared to be mostly dry			
17	Lyse	• Up to 1mL of buffer w/ w.o beads • Sample particles on filter • Qiagen Lysis buffer RLT, RLT +, >RNA & DNA • SPR buffer Aq Methanol	• Bead Beating • Heating • Integrated heater/ filter fit or holder • Grinding • Magnetic driven beating/ grinding • Acoustic/ Sonic • Sequential Chemistry • Automation of the above in closed volumes	DNA/RNA: • (4) Microsonic (8/10 lyse) w/ w.o beads • (4) Magnet flipper • (4) Bead Mill • Grinder • (2) Heat (5/10 lyse) • Ref Bead Beat (10/10 lyse)DA/ rRNA: • (2) Heat	4
18	DNA/RNA purification	• Purification of 500-1000uL of lysate • RNA and DNA in single sample desired.	• RNA and DNA extraction from one sample • Magnetic bead Need sources, size and coating • Glass bead/ fiber columns • Non-centrifuge wash processes. • Automated systems that perform the above.	• (3) Qiagen Membrane Single use only Mock up on MFB May need a pressure sensor • (4) iFast May or may not be renewable Currently using RLT For DA: pass beads to SPR For NA: no beads pass	3

				• (3) Current silica column Renewable • (3) Chip Shop Mag bead	
19	Direct Capture				
20	Reagent storage	• Bulk storage to 500mL • Single use storage 50uL to 1mL	Blister packs Prefilled syringes Imbedded syringes Lyophilized Dry powder (beads)		4
21	Reagent dosing	• Deliver 50-750uL doses of liquid reagent • Deliver single shot reagent doses • Deliver/dose powder (beads)	Compressed gas systems Linear or cam actuators of blisters/ syringes Actuation methods for any of the above storages, such as Dissolving/ melting pills or isolators.		4
22					
23	Rotating Assembly	• Spindle, supporting 30+ cartridges • Structurally supports actuator forces • Support g loads • Retains cartridges against g loads, pressure • Thur bore sufficient for wiring harnesses • Mech should sin freely, but operate +180/-180	• Cantilever spindle • large diameter alignment bearing • Between bearings (req's end support structure) • Cam followers • Additional support at actuator point.		2

24	Rotation Mechanism	- Align cartridges to actuators - Align cartridges to fluid transfer positions - Accuracy: .020 at 11" dia - Torque: drag/stiction of alignment bearings - Specific qty of stop positions or near infinite alignments?	- Anti backlash - Worm drives - Direct gear drives - Geneva mechanism - No-backdrive - DC motor, - Stepper motor - servo controller - direct position sensing		2
25	Flex Line/Cable Rotation Trans.	+180/-180 motion - maintain fitting/seals 2 high pressure (intake, exhaust) 1 low pressure (waste) - Possibly 3+ AM handoffs? - Cable bundle from controls	- Snake pit, coil wrap - torque coil	http://www.igus.com/wpck/default.aspx?PageName=TwisterBand	
26	Cartridge Actuators				4
27					
28	Cartridge Waste Collector				4
29	Waste Storage		- On Cartridge No collector/flex lines, limited vol. - Off Cartridge		2

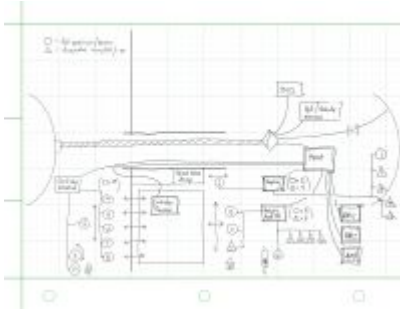
			Higher Vol, req collector/ flex lines		
30					
31	TRANSFER TO AM				
32	Cartridge to AM Selector	• 90+ ports in • 3 ports out.	Mega-multi port valves. (90+ ports) Chip based valve to make multiport system Low pressure, robotic open/ seal fittings.		5
33	AM Selector Injection Loop				4
34	Clean Injection Loop				4
35	Rotor Pass-Thru				2
36	LRAUV Platform Interface				2
37	LRAUV Pressure Housing	• No tie rods thru housing • Seal to tube section • Maintain Structural support of nose/ drive section	• In house design • Lock ring to tube	See model G3LRAUVHousing.sldasm	2
38					

Scored as follows:

- 1: COTS components, or process, readily available, used right out of the box, without modifications.
- 2: New designs, with known technology and variables (no prototype testing needed, can directly design deployment hardware.)
- 3: OEM components, or modified COTS.
- 4: New prototype and designs, with known theory/physics, but unknown technologies and variables. (prototypes need to be designed and tested prior to deployment hardware design.)
- 5: New design needed, but no theory/physics are yet known that would enable the technology.

G3 IO list - Control loops

This page last changed on Jun 19, 2013 by [pargett](#).



Instrument Level

	Control Loops		Inputs	Outputs	Torque/ Force	Speed range	Accuracy	Precision	
1A	Sampling Pump motor A								
1B	Sampling Pump motor B								
2	Spool Valve Actuator								
3	Cylinder Rotate								
4	Cartridge Actuator Alignment								
5	Cartridge Actuator 1								
6	Cartridge Actuator 2								
7	Cartridge Actuator 3								
8	Cartridge Actuator Puck Evac								
9	Cartridge Reagent Valve								
10	A/M Clamp								

11	A/M Clamp Radial Alignment								
12	A/M Hand- off Syringe								
13	Cylinder Align/ Lock								

	Discrete Actions			Outputs					
1	Intake Select 1								
2	Intake Select 2								
3	Bulkhead valve (intake)								
4	Bulkhead valve (exhaust)								
5	Cartridge Valve Actuator 1								
6	Cylinder latch								
7	A/M Valve 1								
8	A/M Valve 2								
9	A/M Valve 3								
10	A/M Valve 4								
11	A/M Clamp								
12									

	Raw Input		Range						
1	ABS Pressure intake		0-500psia						
2	ABS Pressure exhaust		0-500psia						
3	intake/ exhaust pressure differential								
4									
5									
6									
7									
8									
9									
10									
11									
12									

Cartridge Level Control Loops

	Cartridge Control Loops		Inputs	Outputs
1	Puck Heater (70, 85C)			
2	Puck beating			
3	Microsonic Actuation			
4	Heater 2 (Ab Mixer, 30C)			
5	Heater 3 (Filtrate module, 30C)			
6	Heater 4 (Filtrate Ab Mixer, 30C)			
7				

8				
9				
10				
11				
12				

G3 Process Diagrams

This page last changed on Jun 05, 2012 by [pargett](#).

[HAB-DA Process Diagram](#)Ver 0.1

[HAB-DA Cartridge written protocol](#)Ver 0.1

[Sequential Chemistry Filter Module](#)Ver 0.1

[G3 Modular Cartridge 05-02-12.pptx](#) Revised: May 2, 2012

Sequential Chemistry v0.2

This page last changed on Feb 14, 2012 by [pargett](#).

Helpful DEBUGGING commands to discern machine state

This page last changed on Mar 22, 2010 by [jbirch](#).

Here are some commands to help ascertain the state of the ESP:

Flush.location

Shows where the flush puck is

clamp.contains #PC or CC

What puck the Clamp contains (if any)

Storage.pucks.sort

shows a sorted list of the number of pucks in each tube

Storage.pucks[tube#]=nil

Causes the software to forget how many pucks were in tube#

Storage.pucks[tube#]=n #where n is a number

Sets the number of pucks in tube# to n

Storage.pucks[tube#]+=j

Adds j pucks to the software's record of the number of pucks in tube#

Storage.pucks.clear

Causes the software to forget how many pucks were in all tubes

Flush.to clamp #PC or CC

A safer alternative to clamp.loadFlush

Flush.garage

A safer alternative to clamp.unloadFlush

Arm

Shows where the arm is

Arm.owner

Shows which thread owns the arm

Flush.owner

Shows which owns the flushpuck

Arm.changeOwner Thread.current, :force

Flush.changeOwner Thread.current, :force

Changes the owner of the Arm or FlushPuck to the current thread

How To Get the ESP Software Running On Your Machine

This page last changed on Nov 19, 2014 by [kgomes](#).

These instructions are for users who want to get the ESP control software (simulator too) up and running on their local machine. These were written for both CentOS.

Prerequisites

1. Clean install of CentOS 6.6 (this has gcc 4.4 by default)

Steps to build and run

1. I first logged in as kgomes
2. Then opened a terminal window
3. I changed to root using

```
su
```

4. I then created the log directory by doing

```
cd /var/log
mkdir kgomes
chown kgomes:kgomes kgomes
```

5. I made sure git was installed. It was not so I installed it using

```
yum install git
```

6. I also had to install autoconf using

```
yum install autoconf
```

7. And I had to install yacc using

```
yum install byacc
```

8. Then I changed to the root home directory using

```
cd
```

9. I created a directory I could work in using

```
mkdir esp
```

10. Changed into that directory using

```
cd esp
```

11. I needed to build the MBARI version of Ruby, so I checked it out from Brent's repo using

```
git clone https://github.com/brentr/matruby.git
```

12. That created a matruby directory which I then changed into using

```
cd matruby
```

13. Not sure why, but running ./espconfig did not work due to some path problems so to fix this, I edited the espconfig file and adding './' in front of 'configure' in two places

14. Then I was able to run espconfig this way

```
./espconfig
```

15. Once that completed, I ran

```
./espinstall
```

which installed the ruby executable in /opt/mbari/bin

16. I then exited out of the root shell

```
exit
```

which put me back in my kgomes account

17. I created a working directory by using

```
mkdir esp
```

18. Changed into it using

```
cd esp
```

19. I tried to clone the repository, but kept getting a 403 (unauthorized) error which I am sure had something to do with my git configuration as it would not ask for my username and password event though this is a private rep. To get around this, I just opened a browser, logged into to github and downloaded the zip file which I put in the esp directory. NOTE: I did verify this works with the Git clone as well. I had to create an SSH key and add that up on GitHub from the CentOS machine, then the git clone worked fine.

20. Now, in order to setup the ESP environment so it can run on my machine, I edited my .bashrc file and add the following:

```
export ESPhome=/home/kgomes/esp/ESP2Gscript-master
export ESPname=gordon
export ESPmode=simreal
export ESPpath=.:$ESPhome/mission:$ESPhome/protocol
export ESPconfigPath=$ESPhome/shallow:$ESPhome/shallow/$ESPname
export PATH=$PATH:$ESPhome/bin:/opt/mbari/bin
export RUBYLIB="{RUBYLIB:+$RUBYLIB:}$ESPhome/lib:$ESPhome/utils:$ESPhome/protocol"
```

21. You should then source the .bashrc (or other) file to setup the environment

22. Once this was done, I was successfully able to run

esp

to get the ESP server running

Instrument Bruce Software Revision

This page last changed on Feb 04, 2010 by [sjensen](#).

Instrument Software Revision Level

This page last changed on Nov 08, 2011 by [jbirch](#).

These pages are out-of-date (Nov 2, 2011).

Please note when you make changes.

[Betty](#)
[Bruce](#)
[Moe](#)
[Gordon](#)
[NEO](#)
[MaCK](#)

Bruce

This page last changed on Feb 04, 2010 by [sjensen](#).

Software Revision level for Instrument Bruce

OS

Ruby

Protocol

Firmware

Gordon

This page last changed on Feb 04, 2010 by [sjensen](#).

Software Revision level for Instrument Gordon

OS

Ruby

Protocol

Firmware

This page last changed on Mar 02, 2010 by [sjensen](#).

Software Revision level for Instrument Betty

OS

1 March 2010 Version 1.8 by Brent

Ruby

Protocol

Sleepy Firmware

Sleepy: 3.01

Sleepy CPLD

Core Firmware

Dwarf: 3.68

Core CPLD

RValve CPLD

Moe

This page last changed on Mar 22, 2010 by [sjensen](#).

Software Revision level for Instrument Moe

OS

Ruby

Protocol

Firmware

Email from Brent 19 march 2010

Very old Linux OS (v1.5) *** this must be updated *** Old, but OK, Sleepy Gateway firmware (lacks support for DWSM and external sampler)

Old, but working, Dwarf firmware (v2.59)
with special 64hz version for the mfb

Older ruby interpreter (1.6.8-mbari7)

Very old, tweaked ruby scripts (some updates not in CVS?)

NEO

This page last changed on Mar 22, 2010 by [sjensen](#).

Software Revision level for Instrument NEO

OS

Ruby

Protocol

Firmware

Email from Brent 19 march 2010

Updated Linux OS (v1.8p2)

Updated Sleepy Gateway firmware (v3.01) Old, but working, Dwarf firmware (v2.59)
with special 64hz version for the mfb Latest ruby interpreter (1.6.8-mbari8B) Old Ruby scripts

Discussion of 18 Feb 2010

Luke Coletti, Doug Pargett, Jim Birch

1. For July, 2010 WF cruise, ESP team will use Johnson lab 1Km housing. There were some issues with the last time it was used; weird readings--discussion ensued as to why readings not normal.
2. Doug to draw up plans for pressure housing based on original aluminum design, keeping original diameter, using 2 radial o-rings to seal end caps.
3. Doug will draw up plans for probe head opening using the actual probe he has, and getting rid of the current goofy SAE opening.
4. We will make 2 Ti housings; ESP pays for 1, Johnson lab pays for 1.
5. Eventually we will power the deep ISUS from our Deep-Sea Power and light battery stack, which will allow recharging if needed. But for July we'll use Luke's battery pack (especially since it's such a short deployment).

ISUS specs

Based on Luke's LOBO experiences, one 'single stick' battery pack will power ISUS for 6 months if sampling once/hr. Thus, 20 min sampling rate would last ~1.2 months. Duration scales proportionally.

Continued Discussion 31 August 2010

Luke, Doug, Scott, Jim, Ken

1. How will we power ISUS on DESP? ISUS runs on 8-20V, 6-7 watts nominal. Current plan is to run off the DESP batteries.
2. Ken said they can build 2 ISUS starting right now. One will be shallow, one deep. We have also asked for 3 deep probes (\$2200/ea).
3. Luke will give Doug plans to modify the calibrator, and new flow-cell for calibrations; these are nec with the new titanium housing design.
4. Doug will send [plans](#) for Ti housing out for bid. Next steps will be determined by cost/time estimates. Ken has offered us his aluminum housings for deep work.

Lab Automation

This page last changed on Feb 09, 2012 by [pargett](#).

Summary of Technology and COTS from Lab Auto 2012 (San Diego)

Lab Auto 2012

This page last changed on Feb 09, 2012 by [pargett](#).

SLAS 2012 San Diego

Enabling Technologies for G3 ESP

1. Microsonic Systems, San Jose Conact Vibhu Vivek (Pres, CEO)-TALK <http://www.microsonics.com/technology.html> Fresnel Annal Sector Actuator (FASA) create lateral waves w/o cavitation. At different strengths can mix (in layers), shear or lyse. Have a Phase 1 SBIR Grant (NASA) . Also developing hybrid power devices to recapture energy used in the process. Very interested in working with us.
2. Ifast One Step Analyte Technology David Bebee -TALK <http://www.ncbi.nlm.nih.gov/m/pubmed/21423999/>
3. Pall Life Sciences Galina Formovska (Sr. Principal Scientist) Access to bulk membrane compatible with Qiagen buffers, if OEM Qiagen does not work.
4. ThinXXS Germany- Asked if incorporated bead beating to custom made chips... "Could not discuss."
5. MiniFAB-design integration and manufacture of polymer micro and nano systems. Australia
6. Proteomic Technology-Mark Chee (Prognosys Biosciences)-TALK Design Protien in silico- Synthesize DNA-Peptide-DNA library-assay-sequence Example: Look for protease cleaving sites. Peptide portion of Peptide-DNA construct imobilized. Introduce protease. Those with Protease sites are cleaved freeing the DNA side of the construct. Those are collected and sequenced. Imagine spotting Peptide-DNA constructs on Array, expose. Rather than sequencing, probe the array for what is left.
7. Application of Panomics Assay (like our SHA) on hydrogel particles (250uM) Novartis Adam Hill. Section of the particle contained a barcode and multiplex for different captures. With camera has up 10um resolution. After sandwich, sent the particles down microchip and imaged with camera.
8. LUCAS (Lens Free Camera). (Aydogan Ozcan) 10-20cm2 holographic/fluorescent images. Runs on LEDs could get down to low um resolution and keep the same field of view (Wide Field Fluorescence). Run on smart phone. Used software to recreate images: fluorescene arrays, Giardia, E.coli, RBCs infected with Plasmodium, etc..
9. Motion and Control
 - a. Pro-Dex (www.pro-dex.com) has multi axis motion controllers
 - b. Trinamic (www.trinamic.com) also does motion and specializes in incorporating their chips into other custom boards.
 - c. ELMO has a new line of controllers, "gold" line
10. Valve
 - a. Burkert has a couple valves that have hit-and-hold circuitry built into the valve.
 - b. Clippard has a line of diaphragm valves that may be interesting. Typically used in pneumatics. www.clippard.com
 - c. VICI
 - d. Valcor valves
11. Fittings
 - a. Dibafit has some fittings that can handle high pressures.
 - b. VICI does as well.

LLNL PCR heater module

This page last changed on Nov 04, 2009 by [jbirch](#).

1. [Notes from delivery of 3rd module \(April 1, 2009\)](#)
2. [Module 07 checkout notes \(May 22, 2009\)](#)
3. [LLNL-Spyglass meeting 29Oct2009](#)

LLNL-Spyglass meeting 29Oct2009

This page last changed on Nov 04, 2009 by [jbirch](#).

Meeting called by Chris Melancon of Spyglass to discuss LLNL tech transfer issues.

Attendance:

John Dzenitis (LLNL)

Dean Hadley (LLNL)

Bill Bennett (LLNL)

Ivory Engstrom (McLane)

Chris Melancon (Spyglass)

Jim Birch (MBARI)

Much discussion about issues with manufacture of the modules. Ivory arrived with a well-organized list of questions related to manufacture and production of PCR-modules. I learned that of the 12 modules MBARI has purchased, they are divided into 2 lots. First lot does NOT have pins holding end-plates into the cover; second lot does have these pins. There is also a newer version of the firmware that we could have Vincent burn. This would require removing all our boards, sending to LLNL, he would burn and return.

Notes from delivery of 3rd module (April 1, 2009)

This page last changed on Apr 06, 2009 by [jbirch](#).

Jim,

In addition to Dean's comments about unpacking the module (Before you power the unit up, remove the main cover, and remove the packing that holds the boards in place for shipping.):

The module in standby should draw about 160 mA at 12 V dc.

TEMP? should return about 690 (ADC values) at room temperature. You can also check FAN ON, FAN OFF, etc.

When you power up, use CALTEMP 0.0,0.036,0.0 to get the calibration in the ballpark before you do any Centigrade commands. The default in the current firmware is not right. You have to do this every time it is powered up.

PIDTEMP 50.0,0.1,0.0,300,500,100 seems to work well. The default in the current firmware is not right. You have to do this every time it is powered up.

For PCR with FAM, start with 100 milliseconds on Channel 1. For PCR with TAMRA, start with 400 milliseconds on Channel 2. The TAMRA is kind of noisy. For our PCR verifications, FAM at 100 ms started at 1500 and went up to 2500, and TAMRA at 400 ms started at 1000 and went up to 2070.

I don't know how much optimization testing you folks have been doing, but I found it was helpful in dye tests to run a routine with multiple integrations at each cycle. This could probably be used for PCR too:

0:TEMP,93,135000;1:TEMP,60,30000;2:READ,20,20,20,20;2:READ,100,100,100,100;3:READ,200,200,200,200;4:REA

There is a minor possibility of photobleaching with extra light exposure, but we have not characterized that.

John Dz

This page last changed on Apr 27, 2015 by [jbirch](#).

We currently (Apr-2015) have three Melo trackers

The Melo is the 'watch-circle' warning transponder for surface moorings.

IMEI numbers:

300034012090780 (purchased June, 2011)

300234060016190 (serial # 122) (both purchased Dec, 2012)

300234060014550 (serial # 123)

(IEMI number for Sable 5000 on D-ESP: 300034012099780)

User's Manuals

1. [Quick Start Guide v1.2](#)
2. [User Manual v1.5](#)
3. [Watch Circle Console User Manual v2.1](#)
4. [Xeos pricing changes as of Jan 2013](#)

MFB-PCR distribution list

This page last changed on Nov 29, 2010 by [jbirch](#).

Distribution list as of 4 Nov 2010:

MFB	PCR Module #	on Core	who gets?	
tombstone	5	NEO	MBARI	
MFB1	1	Moe	MBARI	
MFB2	12		slated for CMORE (UCSC)	
MFB3	4	Gordon	MBARI	
MFB4			no heater block; no PCR module	
MFB5	7	Betty	MBARI	
MFB6	8		At SCCWRP (S. Cal)	
MFB7			slated for Harvard/Girgius; no ARV motor, no PCR module	
MFB8	none		At Stony Brook, NY (Harbans Dhadwal)	
MFB9	13		At Caltech/Orphan	
MFB10	11		At Stanford (Ali Boehm's lab)	
MFB11	14		MBARI;	
	Spares: none			
	Broken?:			
	3		was originally on Tombstone, but moved #9 there for M0 deployment. Not enough sensitivity.	
	10		removed from MFB6. Bleach leak caused flakey connector.	

	9		removed from tombstone. Erratic diode readings	

Micro-Fluidics Block

This page last changed on Feb 29, 2012 by [jbirch](#).

Administrative

(if asked to 'authenticate' in order to download anything, use 'shore/username' & then your MBARI password)

1. [The MFB User's Manual](#)
2. [MFB command help sheet](#)
3. MFB chargers are Xenotronix HPX-30, and the batteries used are PowerSonic PS-12120 F2.

Fluidics Construction

1. [Fluidics Tubing Diagram](#)
2. [Redesigned ASV](#)
3. [MFB BOM \(2-28-2012\)](#)

The MFB User's Manual

This page last changed on Feb 02, 2011 by [kgomes](#).

The latest MFB manual is located in the Project Library following this path:

<https://mwww.mbari.org/ProjectLibrary/ESP/Micro%20Fluidic%20Block/Users%20Manual/Gen2%20MFB%20manual/>

There are two PDF Versions: [1.0.4](#) or [1.0.81](#)

Phase Separation Chamber

This page last changed on Sep 13, 2011 by [pargett](#).

Phase Separation and Pressure Chamber for Dock Deployments

Power Commands (9-30-08)

This page last changed on Sep 30, 2008 by [jbirch](#).

On all ESPs there have been these
easier to use power control command variants for some time:

```
Power.dwarf :on
Power.dwarf :off
Power.raw :on
Power.raw :off
Power.camera :on
Power.camera :off
```

Power.camera returns true if the camera is powered
Power.dwarf returns true if the dwarves are powered
Power.raw returns true if raw 12V is enabled

On ESPneo, shutdowns will be deferred until all "background"
threads threads have terminated. ESP.shutdown or Sleep.shutdown
will produce a log message to this effect.
The message indicates which background threads are causing
shutdown to be deferred.

You can always get a list of the background threads with:

```
Sleep.background
```

If you want to force a shutdown anyway, here's how:

```
Sleep.shutdown!
```

To power up the ESP after a shutdown:

```
ESP.wakeup
or
Sleep.wakeup
#cancels any pending shutdown.
#does nothing if the ESP is already powered.
#otherwise, powers up and readies all but the MFB
```

If you're impatient:

```
Sleep.restart! #forces a power cycle, reconfigures dwarves, but does
not home
```

ESPs other than neo never defer shutdowns and do not implement
Sleep.shutdown! or Sleep.restart!

--

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Puck Numbering System

This page last changed on Apr 03, 2019 by [jbirch](#).

April 4, 2019

Just had 182 and 186 WCR pieces delivered. We will continue with the following numbering scheme:

TTT MYY-SSSS

Where:

TTT is the three-letter puck type: HV2, LAF, SAF, SH1, SHT, or WCR. Note that HV2 and SHT appear on tops only, and SH1 appear on bottoms only.

MYY is the month (M) and year (YY) in which the puck was manufactured. The month is represented by a number, 1 - 9 for January to September, or the letters, A, B, or C for October, November, and December, respectively. The year, YY, is represented by two numbers for the year.

SSSS is a four-digit serial number for the puck (0000 - 9999).

The following are examples of serial numbers:

SHT 410-1234 is a serial number for an SHT puck top that was manufactured in April, 2010 (410).

SH1 410-4321 is a serial number for a SH1 bottom that was manufactured in April, 2010.

WCR A10-1008 is a serial number for a WCR puck top or bottom that was manufactured in October, 2010 (A10).

Our current (July, 2014) puck count is [here](#).

Email from Scott, January 9, 2008 (updated 1-15-2008):

The current serial number format is as follows:

TTTRSSS

T = Type WCR (top and bottom), SHT (bottom), 1HV(top), S1V(top) LAF(top and Bottom) and, SAF(top and Bottom).

R = Revision/Lot code 0-9, A-Z

S = Serial number 000 - 999. This number resets at each revision, lot change.

The previous Alkab run was Revision code 0. We had a short set of about 5 of the snap puck made by El Camino which were engraved with the R field as 1, which means that the completion set should be lot code 2. This is the set that Nilo is getting ready to send out now. When El Camino delivers the first set of 40 in March they should have lot code 3 and the remainder should be lot code 4.

I have started a [spreadsheet](#) that chronicles the pucks, revisions, lots and serial numbers.

UPDATE (FEB 26, 2008)

The first half of lot code 2 was returned with some Type errors. Revision and Serial numbers remain unchanged, but the new Type designations will be:

WCR (top and bottom)
LAF (top and bottom)
SAF (top and bottom)

SH1 (bottom)
SHT (top)

Note that we have yet to make a full batch of high-volume snap pucks, but when we do, those will be labeled 1HV (top and bottom).

Here is who is doing our etching:

LaserMark
2109 O'Toole Ave. Ste S
San Jose, CA 95131
Phone 408 433-9333
Fax 408 433-9343

Here is what I have packed up for etching:

Type	Top/bottom	Numbered	Amount	NOTE
WCR	Top	040-079	40	
	Bottom	040-079	40	
LAF	Top	040-078	39	1=Missing
	Bottom	040-078	39	1=Missing
SAF	Top	040-075	36	4sent to Gregg D
	Bottom	040-075	36	4sent to Gregg D
SHT	Top	080-159	80	
SH1	Bottom	080-159	80	
TOTAL			390	

I also sent 1 WCR puck (top&bottom) as a font sample. When these come back I will pack up the ones that are to be re-numbered(SHT2000-079). I haven't received a quote yet but Laser Mark said about \$2 each piece + shipping.

UPDATE 3/24/08

The SH1 tops that were misprinted are going to be sent out tomorrow to be re etched along with one of the LAF's that escaped detection last time:

Type	Top/bottom	Numbered	Amount	NOTE
LAF	Top	079	1	Found the Lost 1!
	Bottom	079	1	
SHT	Top	000-079	80	Old etching to be X'd out
TOTAL			82	

That is all for now

UPDATE 2/24/09 There have been several iterations of the above serialization process since this was last updated.

Here is where we now stand:

This is an inventory of pucks that have been serialized and are available for use.								
There are aprox. 1200 more pieces (or 600 more pucks) that have yet to be serialized.								
They are located in the 'B' building lab								
Type	Top/ Bottom	Lot 2	Lot 2	Lot 3	Lot 3	Lot 4	Total	
WCR	Top	40	40	40	39	40	199	
	Bottom	40	40	40	40	40	200	
LAF	Top	40	40	40	38	40	198	
	Bottom	40	40	40	36	40	196	
SAF	Top	40	36	40	39	40	195	
	Bottom	40	36	40	40	40	196	
SHT	Top	80	80	80	80	80	400	
SH1	Bottom	80	80	80	77	80	397	
Total		400	392	400	389	400	1981	990.5
							pieces	pucks
The lot number refers to the 4th place								

in the serialization code:								
				3 letter type				
				1 digit lot number				
				3 digit individual part number				
All parts are numbered 000-079 (except where some are missing) for each lot EXCEPT for :								
				SHT=000-159				
				SH1=000-159				

UPDATE August 11, 2010

Puck order from McLane arrived.

Rec'd 160 SH1, and 80 ea of LAF, SAF, WCR, HV (consists of HV top and SH1 bottom), all laser-etched.

PO 1010318

Here is their email explaining their numbering system (sent Jan 14, 2010):



McLane Numbering Scheme

From: Tim Shanahan [mailto:tshanahan@mclanelabs.com]
 Sent: Thursday, January 14, 2010 8:52 AM
 To: 'Birch, James'
 Cc: 'Pargett, Douglas'; 'Jensen, Scott'; Everlove, Cheri; 'Scholin, Chris';
 Yuki Honjo (yhonjo@mclanelabs.com); Ivory Engstrom
 (iengstrom@mclanelabs.com); Mike Mathewson (mathewson@mclanelabs.com)
 Subject: Puck serial number format

Hello All,

We've been thinking about the serial number format for the pucks and we'd like to suggest some modifications. I'm concerned about duplicating lot numbers and the potential for having runs bigger than 1000 units.

At least for now, I think there's the possibility of McLane and MBARI still continuing to make puck independently. Keeping track of the current lot number could be problematic.

So I propose the following:

TTTMYSSSS

TTT for type code as below.

MY for date code in

M= 1 - 9 for Jan - Sept, A B or C for Oct Nov & Dec

YY for 2 digit year

SSSS for serial number 0000 - 9999

Also, this ensures that there never a letter I or O.

This increases the total number of characters from 7 to 10.



Radio Communication commands for tri-deployment (10-7-08)

This page last changed on Oct 07, 2008 by [jbirch](#).

The radio must be configured one of two ways:

- 1) As a Point to Point master with FreqKey = 4
For use at Santa Cruz with ESPmack
- 2) As a MultiPoint Master with FreqKey = 2
For use at M0 with ESPbruce and ESPneo

After you've plugged in the radio, antenna and power supply...

0) Connect the radio to the laptop's serial port.

- 1) Power on the laptop
- 2) Log in as user esp
- 3) bring up the GUI
\$ startx

- 4) Bring up two terminal windows
- 5) In one change to the root user
\$ su

6) In this root window, start picocom to configure the radio

```
# picocom --baud=19200 /dev/freewave
```

7) Toggle the radio's configuration switch
Configure the radio appropriately:

On the Operation Mode menu select either
Point-to-Point master for Santa Cruz
or
Multi-Point master for M0

On the Radio Transmission Characteristics menu
Select Freq Key of
4 for Santa Cruz
2 for M0

8) Exit radio configuration mode by pressing ESC at its main configuration menu

You should now see a link on the radio if the other side is up.

9) Exit picocom with the key sequence:

```
Ctrl-A Ctrl-X
```

10) Start the appropriate networking stack on the laptop

```
# ifup ppp0 #for Santa Cruz  
# ifup sl0 #for M0
```

11) In the other (esp user) terminal window

```
$ ssh ESPxxx.radio
```

where xxx is either mack, bruce or neo

This should get you an esp user shell on the desired machine

When you move between mack/bruce and neo, you will need to switch both the freewave radio configurations and the laptop networking. Before you can reconfigure the radio, you must bring down the laptop's current networking interface to it.

12) In the root window:

```
# ifdown ppp0 #if you've been talking to ESPmack.radio
```

```
# ifdown sl0 #if you've been chatting to ESPbruce.radio or  
ESPneo.radio
```

Then, go to step 6

Requirements - delete

This page last changed on Jan 29, 2010 by [sjensen](#).

Requirements

1. Project overview

Sampling Wand Functional Req's

This page last changed on Feb 14, 2011 by [jbirch](#).

Functional Requirements Document for D-ESP Wand

Rev. 1.1

Feb 14, 2011

1. The wand shall be capable of collecting a DWSM water sample and providing contextual sensor water from a point (ROV positioned) up to 10m away from the D-ESP and at a two position height; in the vent between -30 to -20 cm, above the vent, 20 to 30 cm above the seafloor. ROV may be used to switch positions.
2. The wand shall operated at water temperatures up to 120°C. [*121 °C is considered to be the temperature limit to life*].
3. The wand shall also be capable of collecting a DWSM sample and providing contextual sensor water from a point nearby the ESP, at an ROV positional height between 100 and 150 cm above the seafloor.
4. The wand shall measure water temperature at the collection point (measurement signal routed possibly thru the CTD). Minimum temperature accuracy is ± 1 °C and resolution is better than ± 1 °C. Measurements shall be collected at 15 second intervals during inhalation and at 2 minute intervals all other times. Minimum calibrated temperature shall be 0 °C. Maximum calibrated temperature shall be approximately 150 °C. Measurements shall be available real-time to be displayed in the control room when the ROV is connected to the D-ESP via cable, and recorded within D-ESP for post-deployment analysis.
5. The wand shall prevent particles greater than 0.5 mm in the longest dimension from entering the collection tube for DWSM. No particle exclusion is required for the contextual sensor water.
6. The wand shall include sufficient cooling capacity to deliver water that does not exceed 25 °C to DWSM, the contextual sensors, and water pump.
7. The wand shall deliver water to the contextual sensors at a constant flow rate ($\pm??$) between 500 and 1000 mL/min.
8. DWSM intake max rate shall be $\frac{1}{2}$ of the wand delivery rate.
9. The wand shall be flushed between sampling events so that uncontaminated water is collected and delivered to DWSM and the contextual sensors during subsequent sampling events. It would be preferable that the contextual sensors do not make measurements of contaminated water at any time and that continuous time-series are collected throughout the deployment.
10. The wand and tubing shall be managed and protected, during deployment and recovery, to prevent damage and fouling with ROV hydraulic lines, manipulators, and/or the thrusters.

Sandwich Hybridization Assay

This page last changed on Dec 21, 2012 by [jbirch](#).

1. [SHA development protocol](#) (v.1--Dec 20, 2012)

Task Wish List between D-ESP deployments 27OCT--25NOV, 2009

This page last changed on Oct 15, 2009 by [jbirch](#).

D-ESP get retrieved October 27, 2009 and re-deployed November 25, 2009.

Below, add to the list of 'to-dos' before the November deployment back on MARS:

1. Complete integration of Data Acquisition subsystem
2. Ground Fault subsystem
3. Remote Host reset

Comments

4. Investigate remaining puck handling problems warm and cold

-- still seeing Elbow errors even when Forearm not pressing puck against backstop

5. Add software check to ensure mission continuation's startTube matches last used

6. Consider adding a thin o-ring to seal LAF pucks in clamps

7. Cool oil down to 3C and check its viscosity

8. Determine why sphere appears to be electrically connected to frame

9. Try to determine how much gas is dissolved in our silicon oil

-- does this explain pressure increasing slowly during sampling?

Posted by [brent](#) at Oct 07, 2009.

Very cold Syringe Part Numbers

This page last changed on Jan 21, 2010 by [sjensen](#).

From Kloehn, these are custom syringes designed for us to operate down to 0C.

25 ml 29559 Rev A. - near 0C these syringes will leak past the first seal but the second holds beyond -10C

10 ml 30367

2.5 ml 29558

1 ml 29557

This page last changed on Oct 30, 2008 by [jbirch](#).

Present: Chris S., Scott, Kevin, Jim, Doug, Wayne, Addie

Absent: Cheri, Brent

Deployment Update

- Thanks to all on an awesome deployment
- Post-can QC:
 - Bruce has a leak, so images not looking good. South Carolina wants to do some tests; if we can do in 1 week great, otherwise should send their reagents back. Cheri back on Monday and will work on finding leak.
 - Errors during deployment:
 - Bruce: puck failed to go to camera seal
 - Bruce: developed leak on processing side
 - Mack: error on removing flush puck from garage
- Chris & Scott will work on tracking down the bad puck Bruce had during the deployment to see if there's a smoking gun...

Machine Builds

- harmonic drive has been running all week; working better, but Scott needs to check it more closely.

MFB

- Addie: wil check with Jose about status of voltage regulator boards
- 64MB host boards (4) ordered; host ribbon cables ordered
- Lots of work for Jose that may require formal work request. Jim will check with Mark Brown
 - measuring for wire harness; MBARI will build 2, rest will be sent out
 - after these measurements, Jose/Scott will do schematic
 - Jose will also be involved with serial connector to PCR builds and making 1 connector joining Grill to core or to stand-alone power supply.
- Jim will contact LLNL about January PCR module delivery
- NAMING CONVENTION: Grills will be sequentially numbered starting with MFB01. Subsequent will be MFB02, MFB03, MFB04, etc.

Software

- If we decide to roll-out new Ruby code, it is better to do earlier than later as we'll need a stable platform by March. Must meet with Brent for debugging NEO results.
- See 2009 schedule below:

DWSM

Sphere

- Roughly 2 weeks machining left
 - bottom is off lathe and in mill; finishing ports
 - top is in lathe; found a void--worried there may be others. Waiting on X-ray quote from Tapemation. Doug to notify Wah Chang, who may be responsible for repair.
- will be using vulcanized assembled O-rings @ \$15/each.
- Fasteners to be ordered--Ti vs. SS; still getting prices and lead times, but whether we go on Northern expedition or go on MARS will influence which we purchase
- bulkhead penetrations still to be made in-house; will talk to Scott about min-K connectors
- Where will sphere sit upon delivery? Will ask about back of Larry's space or storing in high-bay.

DWSM

- Build has begun; currently waiting on Dean's valve parts
- much testing can be done with current dwarves; all boards for testing are available through Dick.

GUI Development

- GUI is now parsing data. Kevin wants to store in Alfresco since this is accessible via the web to outsiders without having to give out MBARI accounts.

Other Items:

- Bldg B lab will eventually need cleaning; Doug has his space along east wall; center will be where cores sit.

2009 deployment schedule looks like this :

- Winter/Spring -- series of DWSM/sphere test deployments. Last will be a Flyer deployment (5 days?), then several week break, then Northern Expedition in July.
- Spring -- series of S. California pier deployments; dates and lengths flexible, but likely 3 machines in three different cities for 1 month
- End of 2009 -- MARS deployment
- Above could change if N. Expedition gets canceled due to budget issues. Will know more after Nov. 13 Packard Board mtg.

Comments

Regarding Bruce's post can QC errors:

Roman and I now believe that the camera seal did not go to the DA puck

rather than the other way 'round 😊 If you look at the high-res image
shortDA08oct2909h100ml70s.tif

one can plainly see that the puck is bright and blurry, but the filter spots
are in focus. Is it possible that the camera seal spring loaded seal mechanism
got stuck? Note that, if this were to happen in the can, we probably would not
even notice it, as it would be already very dark in there anyway.

If we don't think the mechanism got stuck, we should do some tests to determine
how far out of position the elevator would have to be to yield an image like the
one observed. (spots in focus with puck body clearly visible)

Regarding Mack's hand being unable to pull the flush puck from its garage:

The forearm was barely moving with high current levels when these errors occurred.
Recall the the current limit on the Forearm axis is set so high that an overcurrent cannot
occur unless the motor short circuits. The upshot is that the forearm was stuck.
Could the ball bearing spring mechanism that holds the flushpuck in place be sticking
in the "up" position?
We've seen this before...

@08:49:14.96@I2C::Servo::AbsMoveQuery[37:20->26] #0 to 2650
@08:49:15.68@I2C::Servo::AbsMoveReply[37:26->20] trajectoryErr with status:

@08:49:15.70@Slide::Error: Forearm trajectoryErr
@08:49:15.73@Retry #1 of 3
...

I just tried to manually remove the flush puck from its garage on Mack
and Bruce. Bruce had the normal detent. Mack's appeared to be stuck in its garage.
I did not remove it so others could compare.

Posted by [brent](#) at Oct 30, 2008.

Interesting idea about flush pucks being stuck. Chris and I gave them a good scrubbing before
deployment....

Spoke with Mark Brown about our need for considerable Jose time; he said just talk to Jose who, if too
overloaded, will go to Mark. I will try and see him tomorrow (Friday)

Posted by [jbirch](#) at Oct 30, 2008.
