



OCEANOGRAPHIC DECISION SUPPORT SYSTEM (ODSS)

A TOOL TO IMPROVE EFFICIENCY OF BIOLOGICAL OCEAN PROCESS STUDY

ODSS Requirements

8 May 2012

Thom Maughan

TOC

- Background: Team, CANON, development approach, etc
- Software Architecture
- GUI Requirements
 - Situational Awareness
 - Planning
 - Data Analysis (ingest, storage options, workflow, search, access, query tools)
 - CoSci
 - Water Management
- Infrastructure Requirements (features)
 - Comm backplane (ingest, notification, storage, retrieval, client apps,
 - Server-based (shore-side) Autonomy

Who

- **Kevin Gomes**, Web applications (GUI), Web services
- **Danelle Cline**, Backend server, data access and visualization automation, web applications
- **Mike McCann**, Database, web services, communication backplane
- **Tom O'Reilly**, communication backplane, mobile apps
- **Mike Godin**, Web App, AOSN tools integration, update
- **Duane Edgington**, engineering execution management
- **Thom Maughan**, continuity, high level requirements and priorities, 'customer interface' to CANON PI's, PM and Lead Engineer
- **Francisco Chavez**, CANON Project Manager
- **Jim Bellingham**, CANON Lead Engineer
- **Kanna Rajan**, Distributed Autonomy PI, ODSS Commissioner, CANON PI

Contents

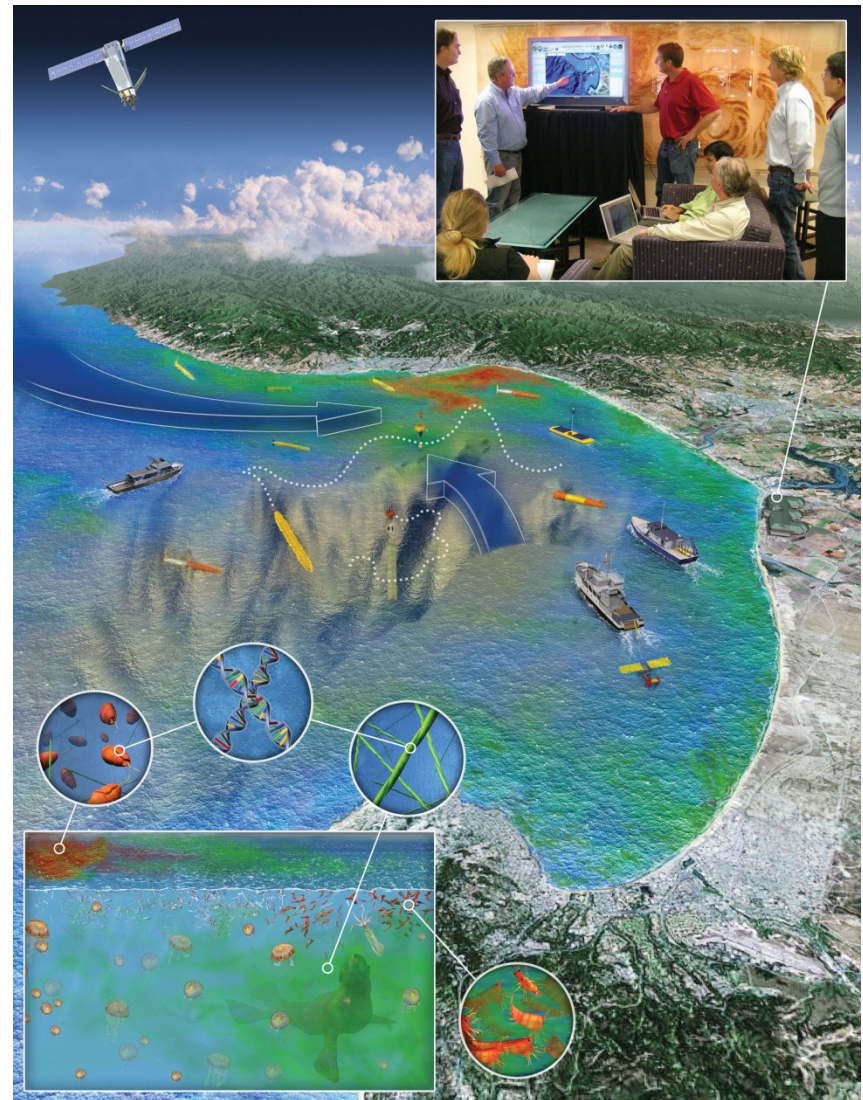
- What the heck is CANON?
- Why do we need a Decision Support System?
- Where are these ideas coming from?
- How did we figure out what to build?
- What are the Components that make up a Decision Support System?
- What's been done?
- Next...

MBARI “CANON” Initiative

Controlled Agile Novel Observation Network

CANON Science

- Persistent ocean presence reveals ecosystem dynamics
 - Several weeks each campaign, several times a year
- Four science research themes in CANON.
 - Coastal phytoplankton blooms
 - Zooplankton dynamics
 - Oxygen minimum zones and ocean acidification
 - Open ocean eddies and global primary production.

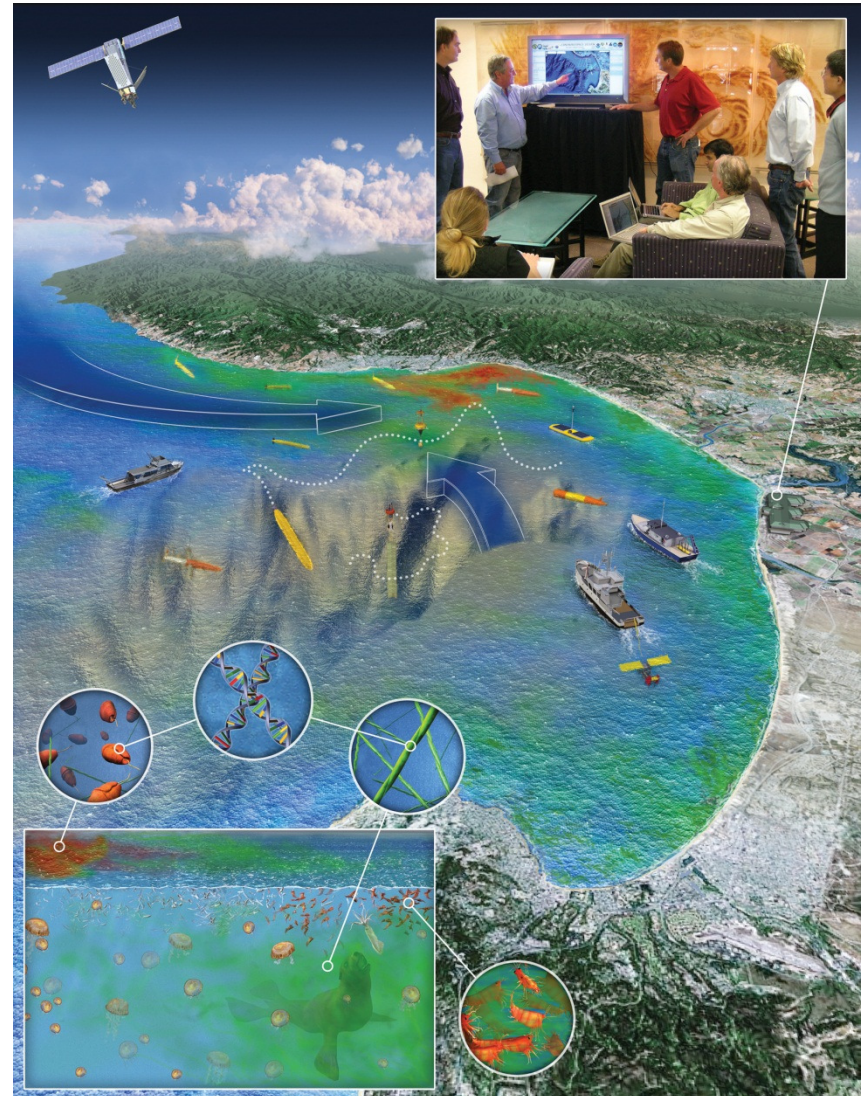


MBARI “CANON” Initiative

Controlled Agile Novel Observation Network

CANON Technology

- Each CANON science theme involves:
 - Process driven, ecologically oriented field experiments
 - Multi-platform, multi-sensor, multi-disciplinary, multi-scale
 - ‘Patch Tracking’ - Map, Tag, Track and Sample.
- Technology themes in CANON
 - Sampling technologies
 - Experiment and Data Management (ODSS)



Why a decision support system?

- A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities.
 - DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may rely on **rapidly changing situations** and not easily specified in advance. (wikipedia)
- Why a Decision Support System?
 - Adaptive Experiment planning, 'patch following'
 - Collaboration and communication
 - Visibility on 'what is happening' in real time
 - Logistic agility for platform planning and deployment
 - Centralized data access for analysis and data and results sharing
 - Experiment logging – why, what, where, when
 - Dissemination of results

Decision Support – What Decisions?

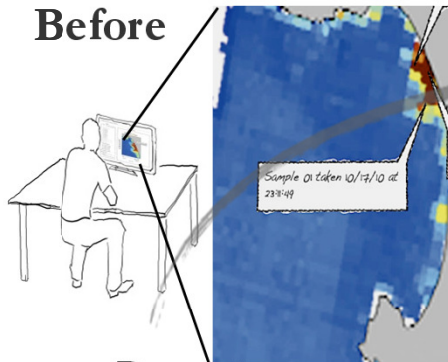
- Deciding when and where to sample
 - Hypothesis driven operational plans dynamically adjusted based on real time data analysis
 - “Patch Following”
 - Drifter, AUV, Model, Human
- Deciding which water samples are best to invest for thorough analysis

Technology Trails

- Rajan Lab – Planning, Distributed Autonomy, Mixed Initiative For Mars Rover at NASA
- Bellingham Lab – AOSN, Collaborative Science software tools, LRAUV
- MBARI Data Management – SSDS, One Stop Shopping, Upper Water Column Data Visualization
- Where are the Ships?
- Cruise Plan, Expedition Database

Oceanographic Decision Support System (ODSS) Workflow

Before



- Data collection
 - recent events
 - historical
- Analysis
- Planning
- Simulation experiments (VPE)
- Populating database(s)

During a Field Experiment



- Situational awareness
- Planning
- Collaboration
- Annotation, Tagging
- Logistics

After

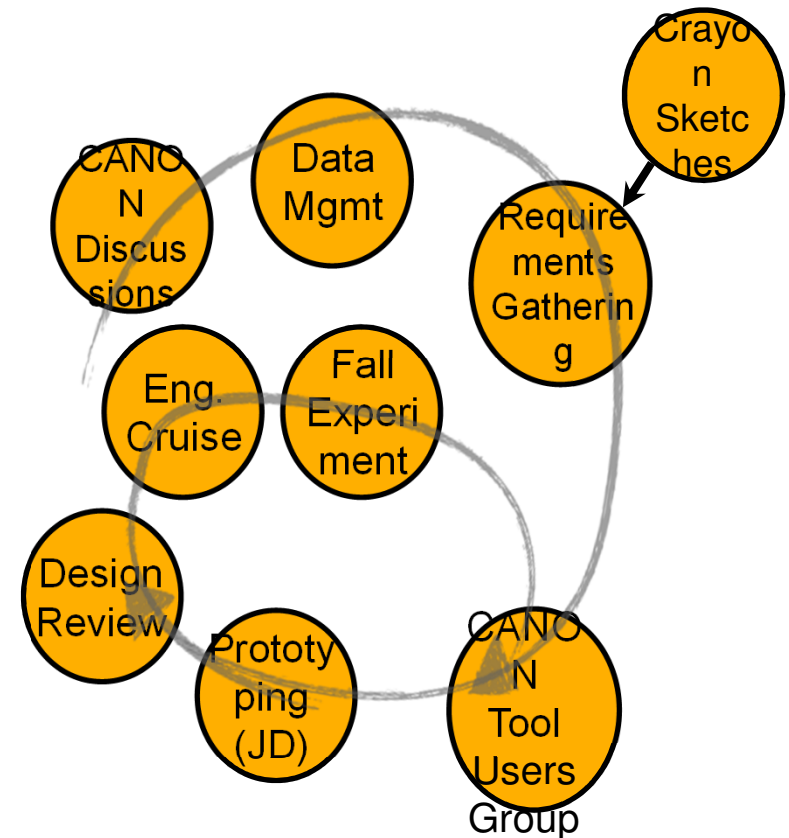


- Replay
- Analysis
- Archival use
- Dissemination
- Outreach
- Water Sample processing

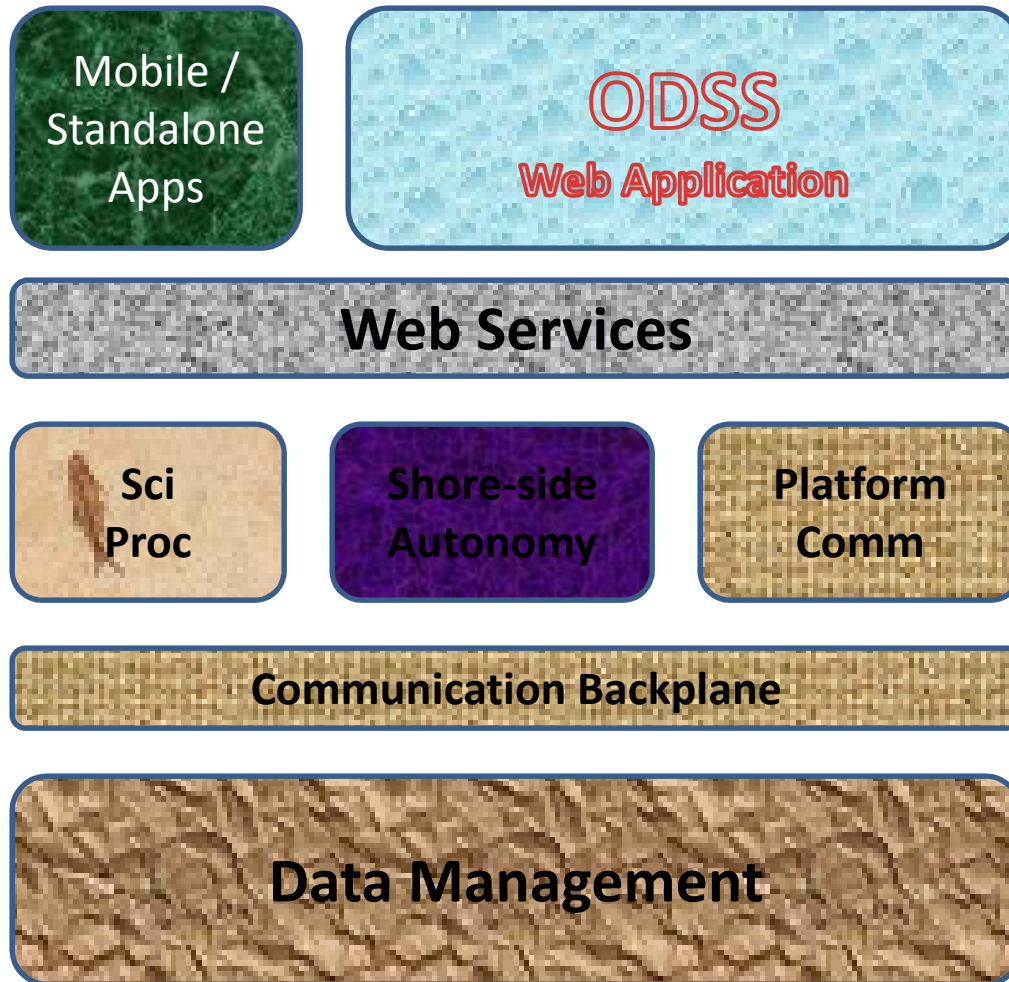
Software Development Approach

Spiral Development

- Started with the CANON experiment workflow analysis
- Pencil sketches as a guide
- High level architecture specified
- Prototyping and 'agile' software development
- For the first prototype, focused on features used 'during the experiment'
 - Situational Awareness
 - Planning
 - Collaboration
 - Data management



ODSS Architecture Block Diagram



- **Web Application**
 - Javascript, Sencha Ext-JS
 - OpenLayers – map flexibility, printing without license
- **Other Apps**
 - Mobile Apps
 - Standalone applications
 - Off the shelf aps (Ocean Data Viewer, etc)
- **Web Services**
 - OGC Standards to enable 'other tools' (WMS, WFS via MapServer).
 - Python packages to aid geo-spatial query
 - Backend Python scripts
- **Communication Backplane Service**
 - Status/Control message routing
 - Platform communications
 - Publish / process / subscribe model
 - Inter-module communications
- **Science Processing Interface**
 - Framework that allows Matlab, other science / research processing to plugin – access data, contribute results, actons or service.
 - AI based Planning
 - Adaptive Sampling
 - Simulation / Predictive Modeling
 - Automated Event detection, tagging
 - 'Crowd Sourcing
- **Data Management**
 - Spatial Temporal Oceanographic Query System (STOQS)
 - Python ORM - Django
 - Tracking Database for deployed assets
 - General Purpose database, SSDS
 - File system

ODSS GUI Design

- Web Application, run in an internet browser
- A collection of tabs called perspectives
 - Situational Awareness
 - Planning
 - CoSci
 - Data Analysis
 - Water Management

ODSS 2012 Priorities

- [1] ODSS bug fixes (effort plan 20%)
- [2] Data Analysis (effort plan 60%)
- [3] Planning Perspective (effort plan 20%)

ODSS Generic Features

- [1]Browser support (2011 and 2012 versions)
 - Firefox
 - Safari
 - Internet Explorer
 - Google Chrome
 - iPad via browser
- [1]Browsers not supported, detect and display “Your browser is not supported, suggested using <one of the above>...”
- [2]Add login feature
 - Single signon with CoSci and Confluence using OpenID
 - Users are not required to login to see situational awareness and planning, however users cannot share information or access data.
- ODSS running ‘all the time’ – scheduled maintenance with notification to user list. Up without interruption during the experiment ‘five nines’

ODSS Situational Awareness

Situational Awareness

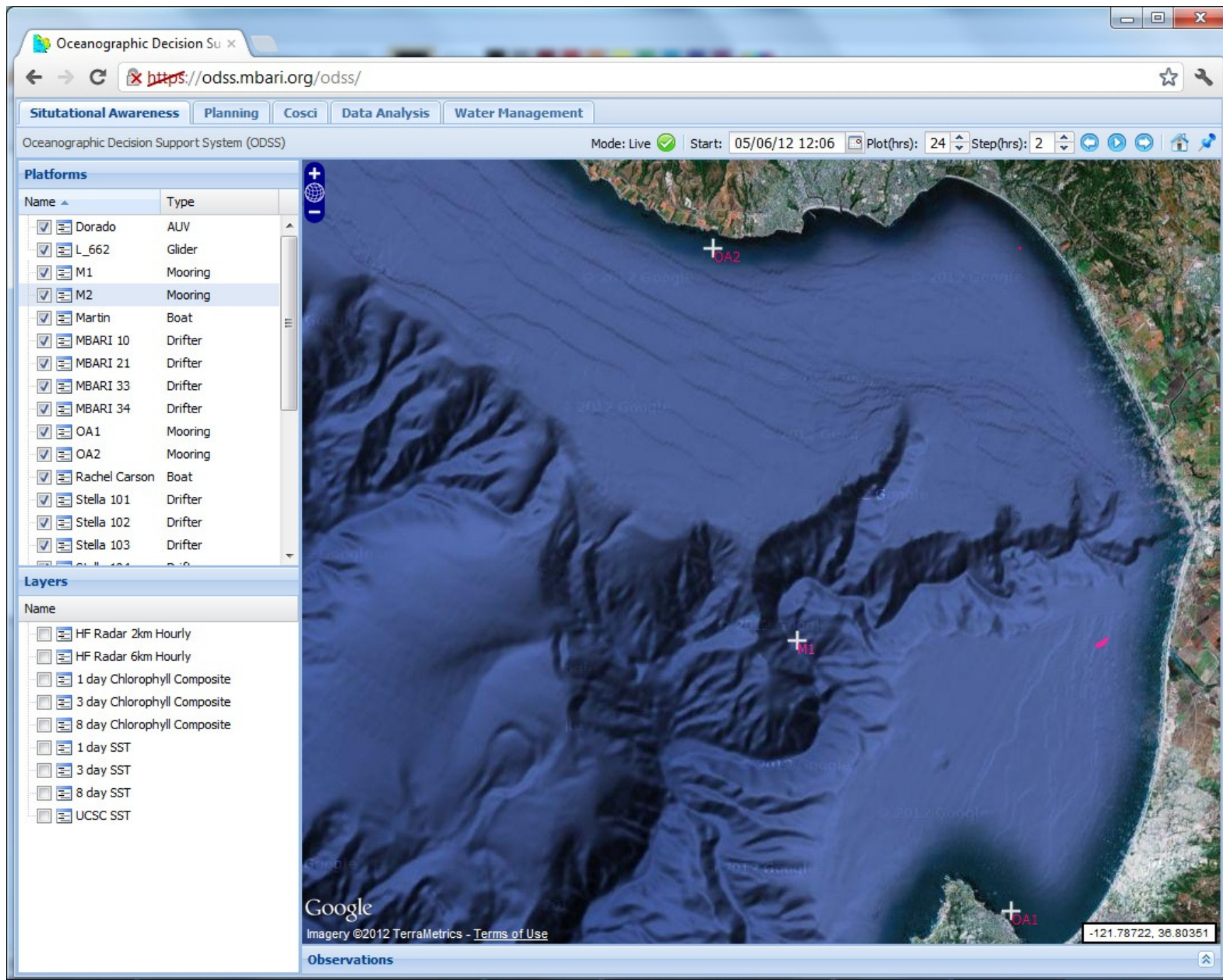
- Purpose:
 - What's Happening?
 - Where are the Platforms?
- Remote sensing and other science products available as transparent overlay on the map
 - What can be seen from space?
 - How's the Weather and Sea state?
 - What do the models tell us?
- Playback to see trends
- Real time observations
- 'Plan vs Actual' vehicle tracks
- Details
 - 'data age' information: for remote sensing and for platforms as time since last update for platform tracks.
 - Platform location available in text form with copy/paste.

[1] Situational Awareness

- [0] 'Hit Refresh' on browser and all platform tracks paint within 3 to 5 seconds
- [0] Show an 'active' map of the experiment region
 - [1] Real Time platform position and tracks
 - Platform track enable/disable
 - Platform position in text (copy and pastable)
 - [3] Sensor Tracks
 - low res sensor data as track color for mobile assets sending sensor data (AUV, Waveglider, LRAUV, gliders).
 - Sensor tracks can be implemented as transparent image overlay
 - Sensor tracks can be 'hard coded' to one sensor and option to allow user selection removed if needed for performance reasons.
- 'Decision data' transparent overlays
 - [1] fix hard coded list of remote sensing / data products, produce documentation on how to add transparent overlay product.
 - [3] Future: we want to allow individual users to select which data products will be displayed
 - [1] 'age' of data product (transparent overlay) and time of last update for platform location
 - [1] layers view should be latest only – define what time window, age of data product needs to be made available to the user
- Asset plan vs actual (next 'box' along with actual track)
 - [3 tbd] Shore based autonomy projections
 - [2] Improve the 'actual' so that it shows the AUV track and not the surface position reporting
 - [1] Show 'plan' layer from planning perspective as a layer
- Playback animation
 - [0] Fix slowness
 - [0] Show Water sample locations, Sensor tracks – [1] default is on (enabled)
 - [1] Work with Danelle and Mike M on backend optimizations for playback

Other Situational Awareness Features

- [2] 'home' location and map view that is remembered for individual users
- [1] documentation on procedure for producing a 'transparent overlay' for the situational awareness map. Ex. Geotiff
- [1] Add AIS sources for ships information (as in older ODSS), default is off



Platforms

Name ▲	Type
☒  Dorado	AUV
☒  L_662	Glider
☒  M1	Mooring
☒  M2	Mooring

☒  MBARI 34	Drifter
☒  OA1	Mooring
☒  OA2	Mooring
☒  Rachel Carson	Boat
☒  Stella 101	Drifter
☒  Stella 102	Drifter
☒  Stella 103	Drifter

Layers

Name

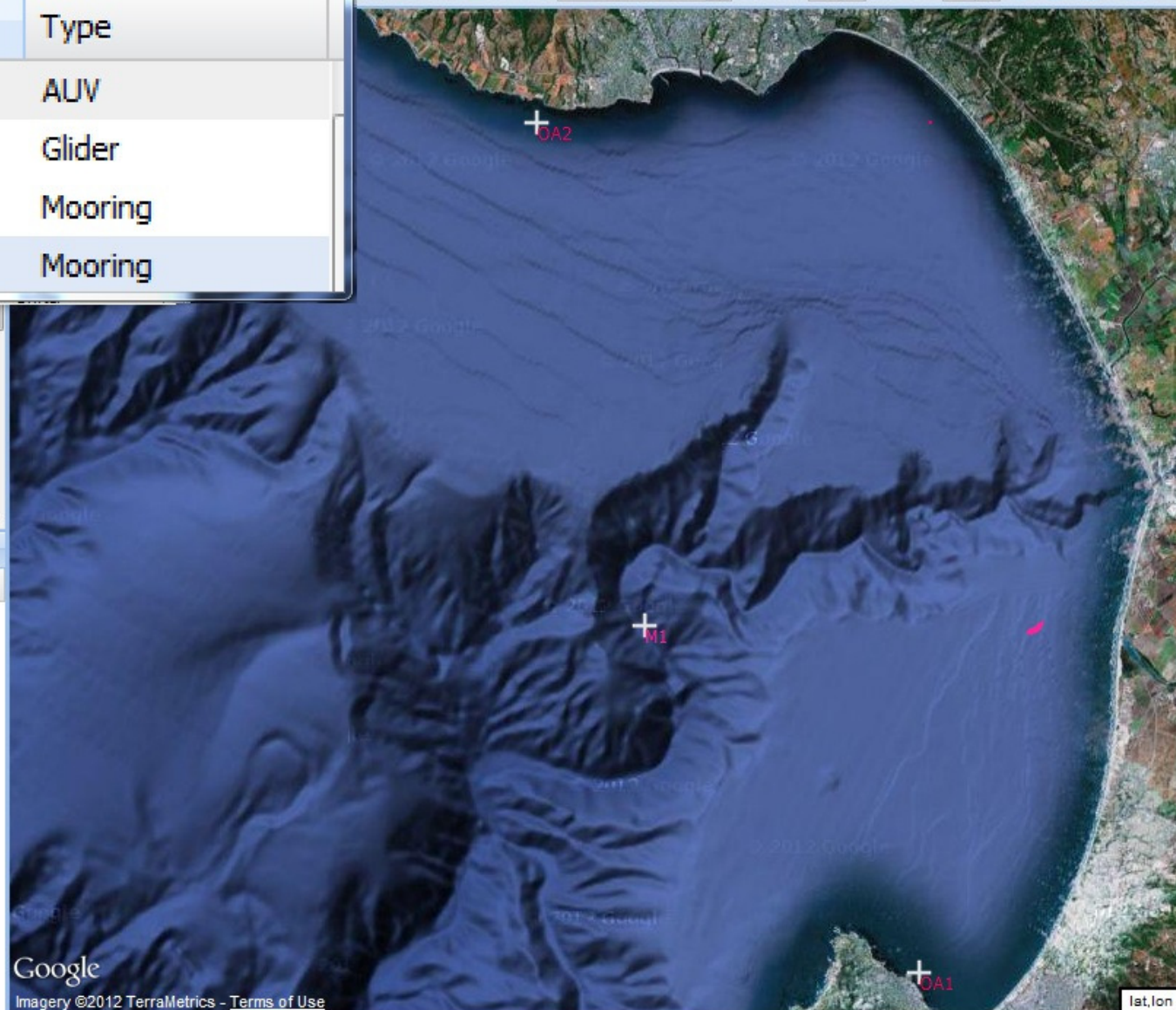
☐  HF Radar 2km Hourly
☐  HF Radar 6km Hourly
☐  1 day Chlorophyll Composite
☐  3 day Chlorophyll Composite
☐  8 day Chlorophyll Composite
☐  1 day SST
☐  3 day SST
☐  8 day SST
☐  UCSC SST

Mode: Live 

Start: 05/06/12 12:07

Plot(hrs): 24

Step(hrs): 2

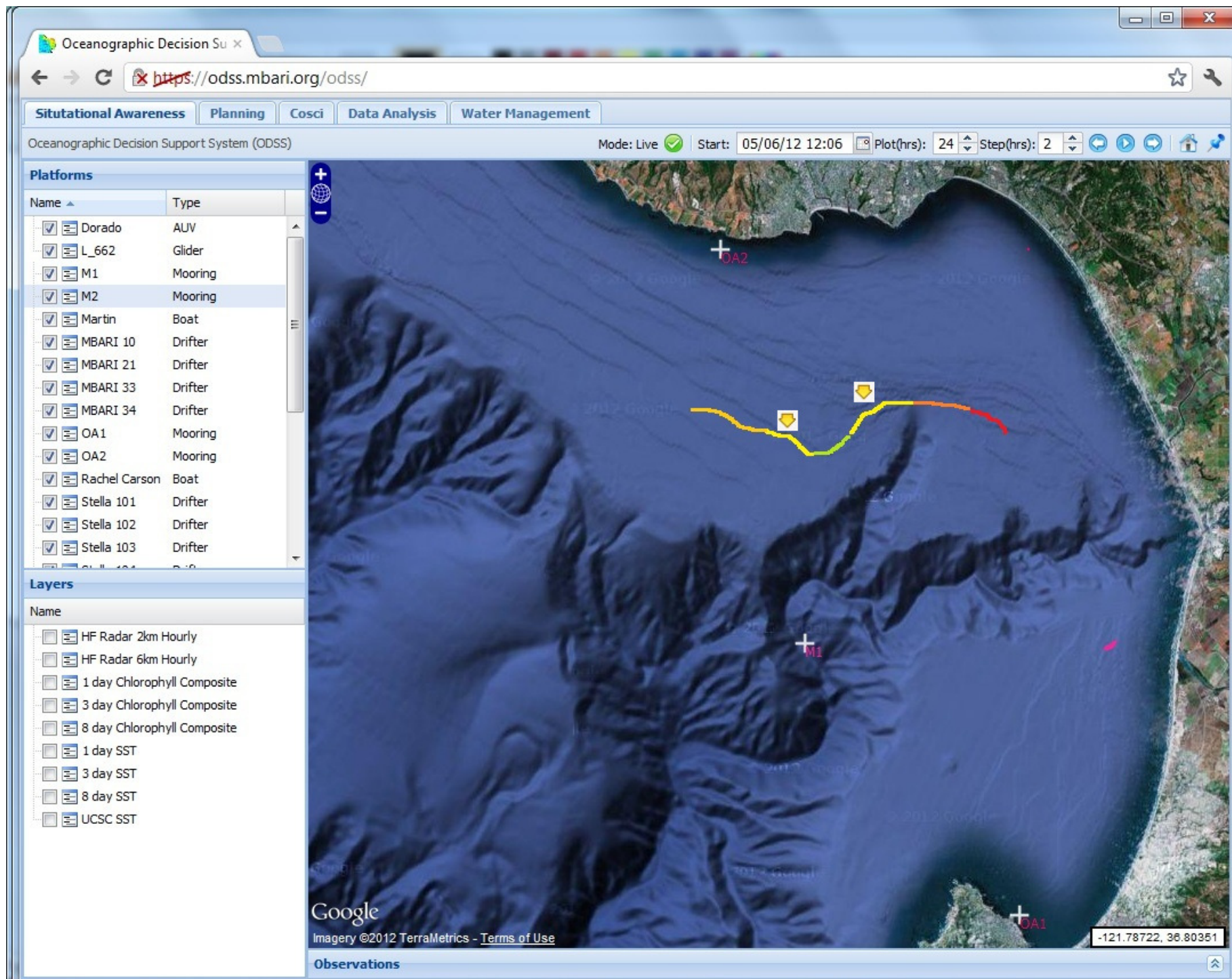


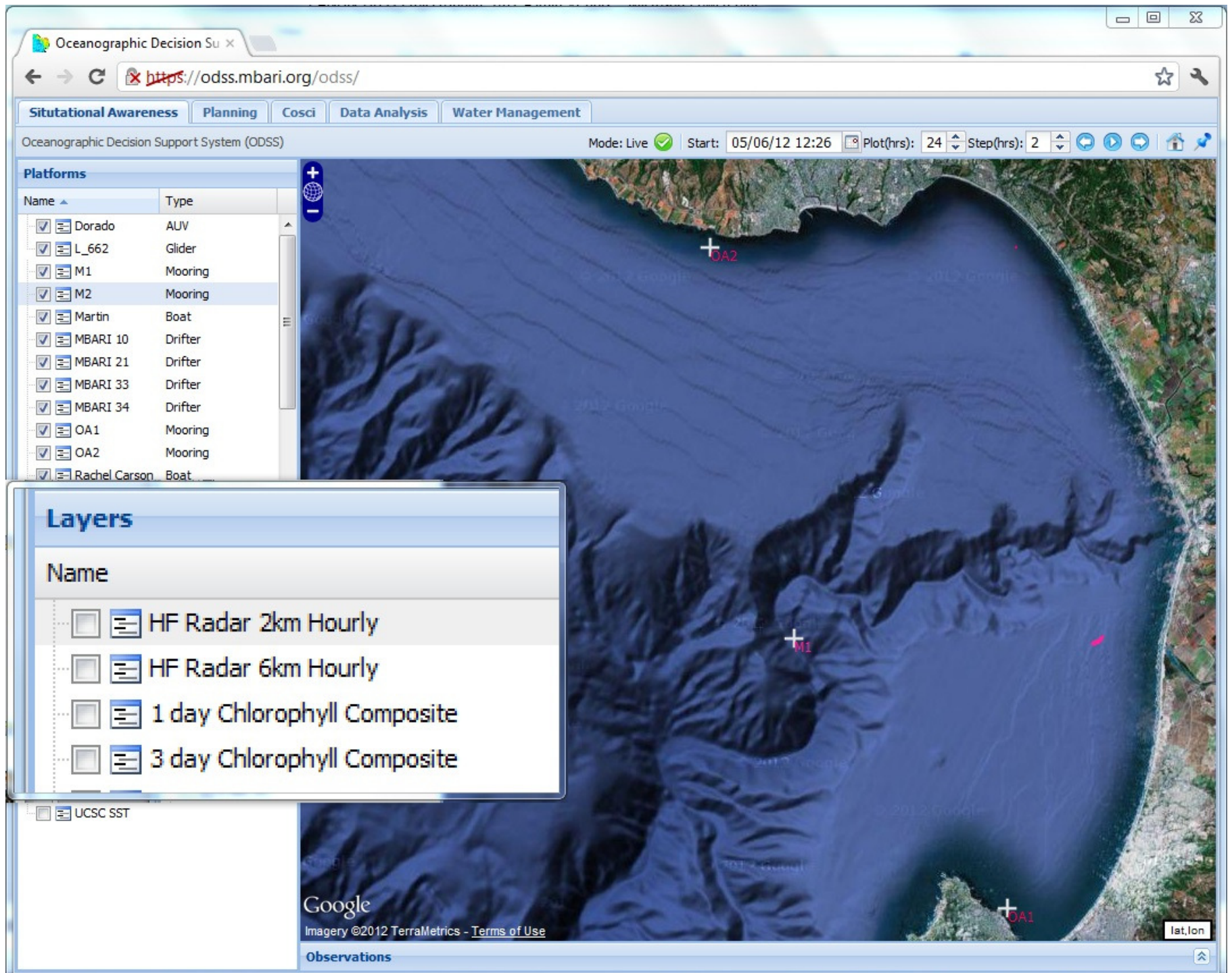
Google

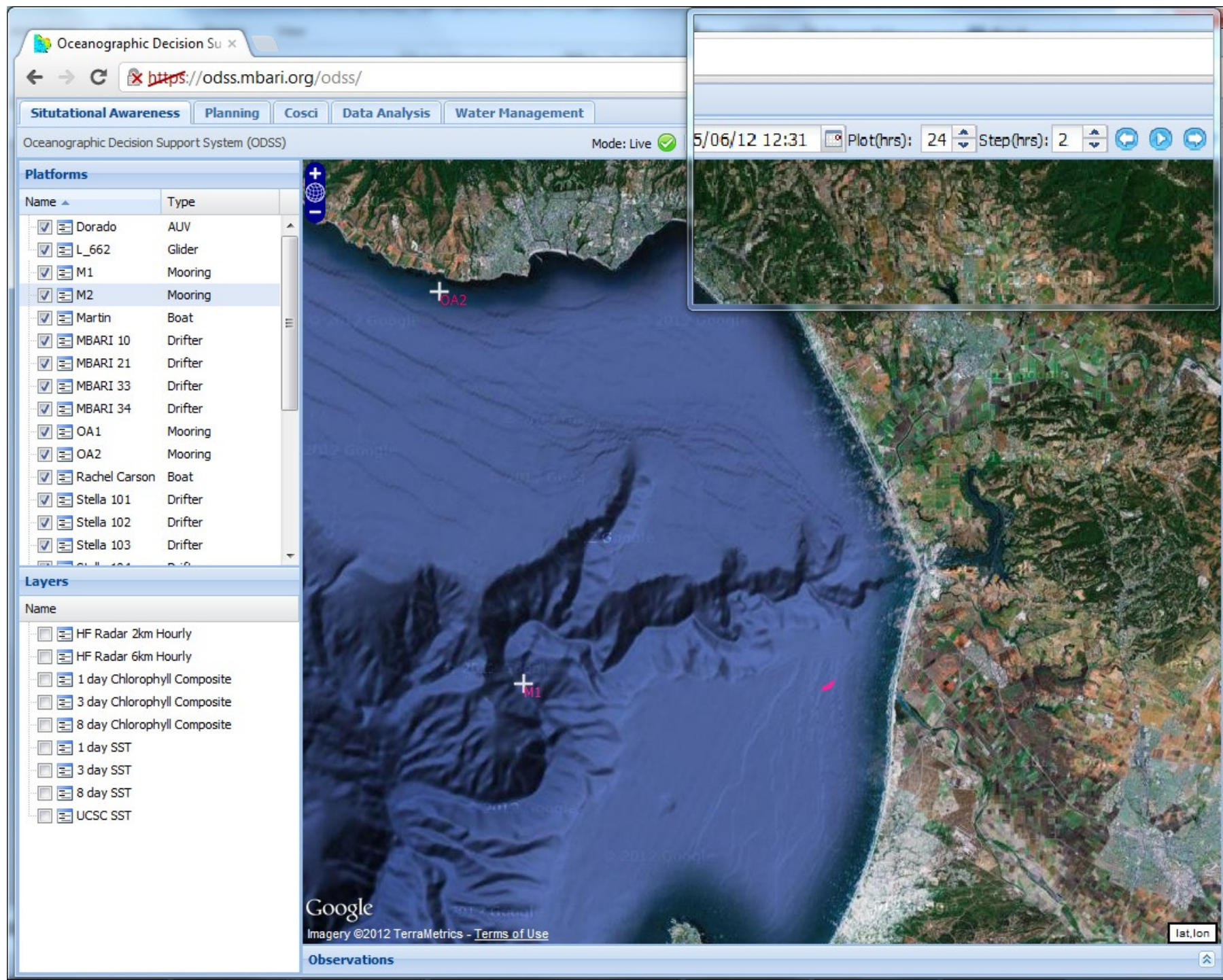
Imagery ©2012 TerraMetrics - [Terms of Use](#)

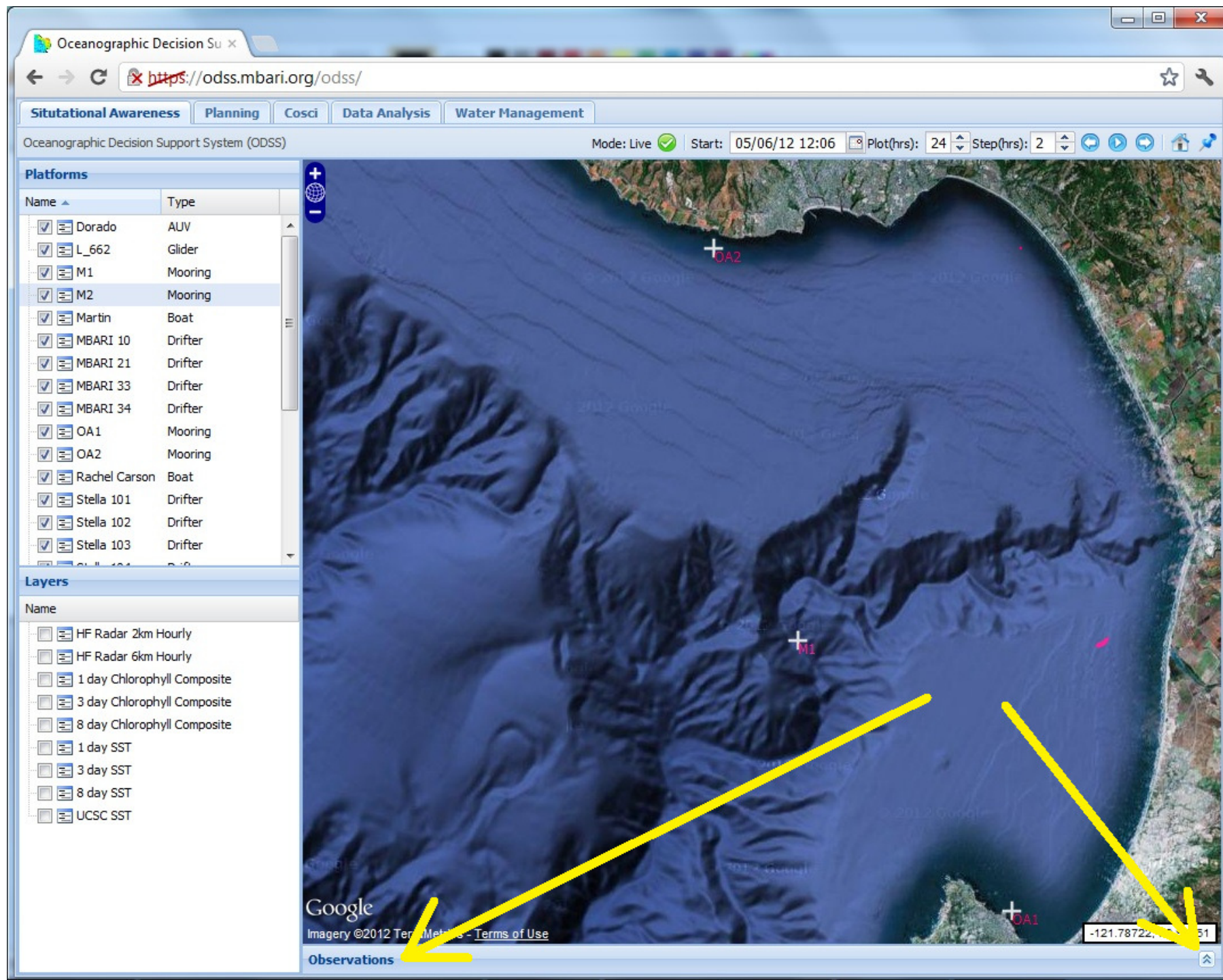
Observations

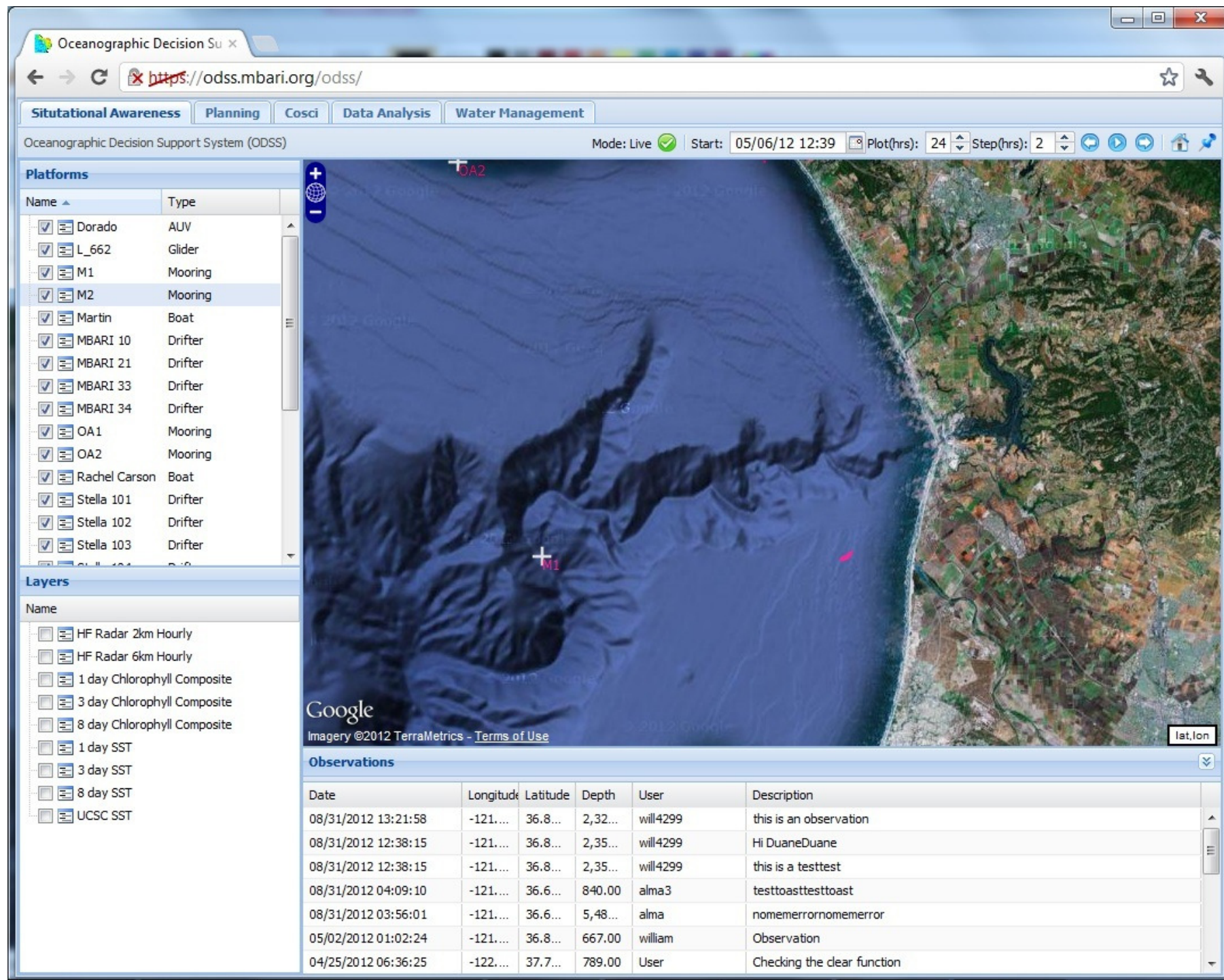
lat,lon





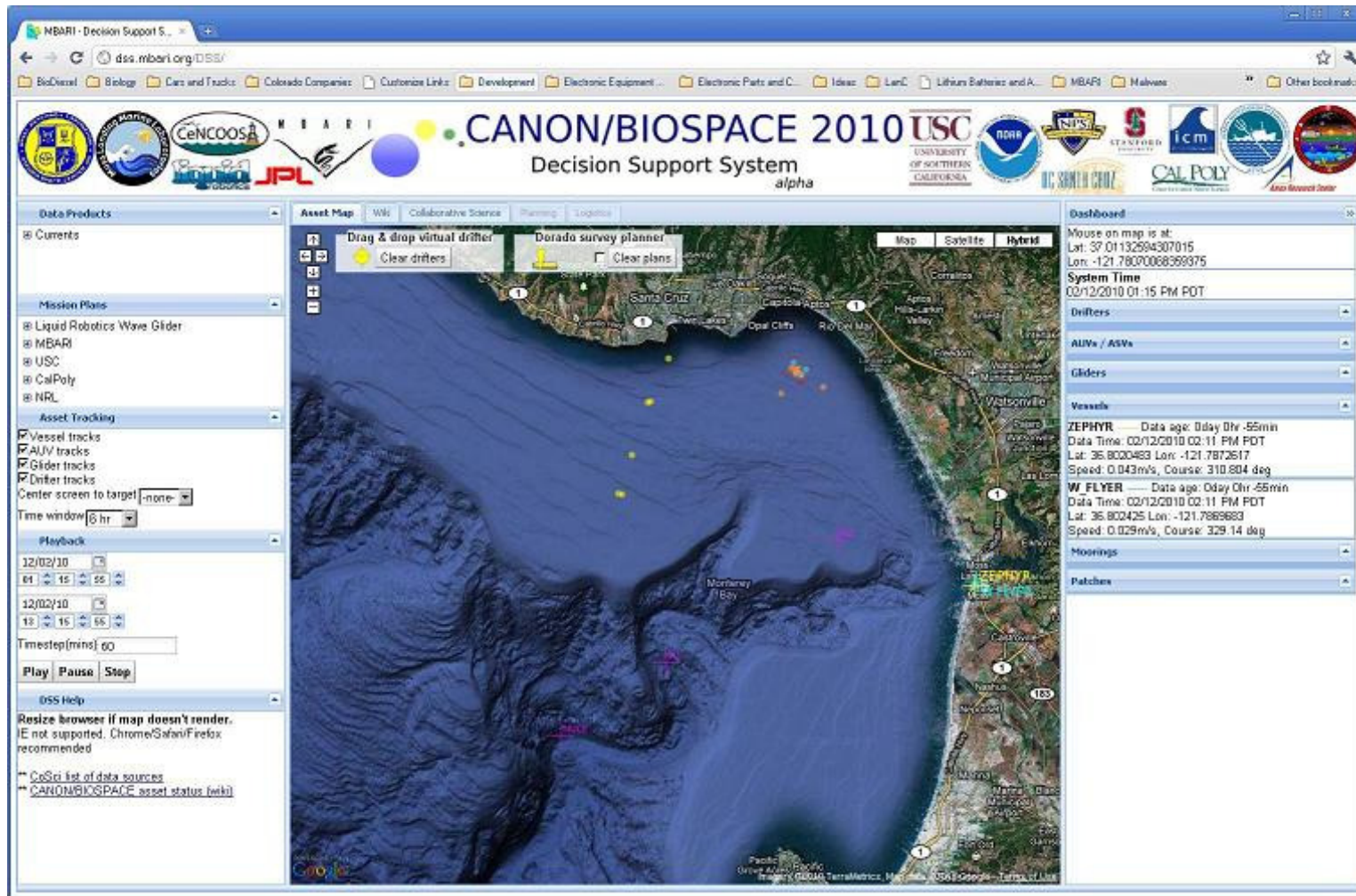






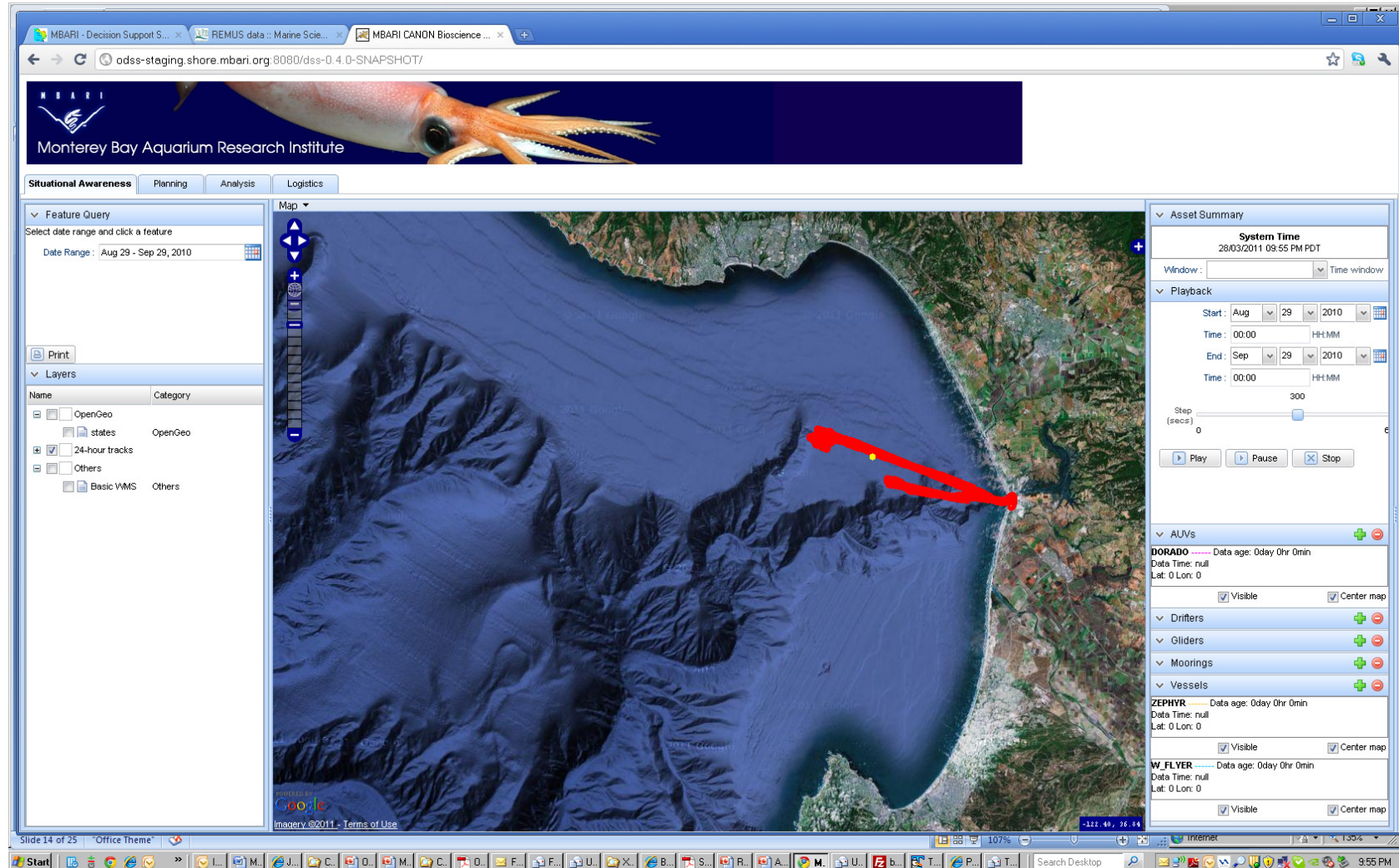
ODSS First Prototype 2010

Situational Awareness



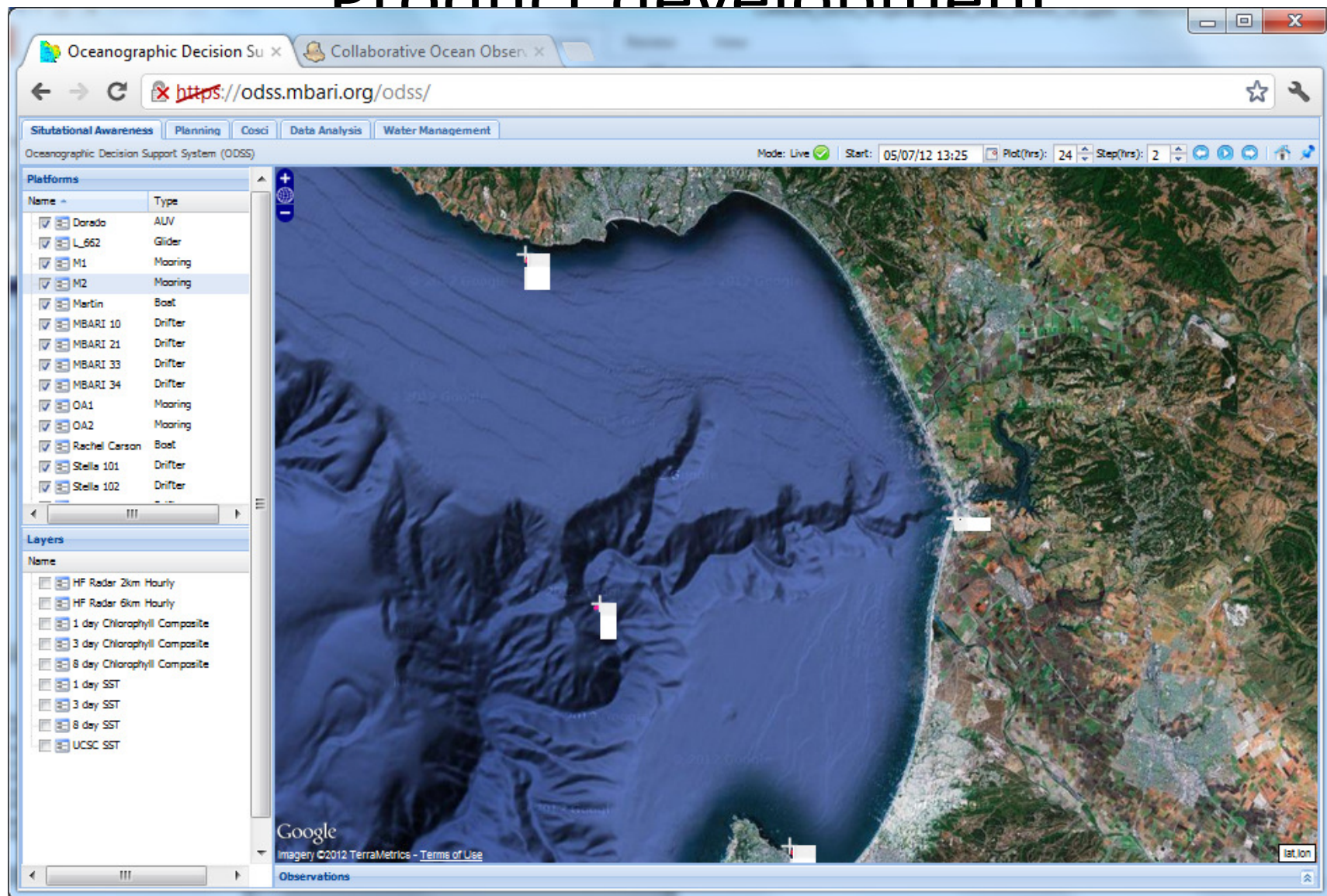
ODSS Second Prototype 2011

Situational Awareness



ODSS Situational Awareness 2012

Product development



ODSS Planning Feature

ODSS Planning Feature – Day Plan

- [1] Visual Planning, platform coverage calculator (day planner)
 - Used for: can the vehicle cover the desired area?, is the vehicle in a safe operating area?
 - Data layers inherited from Situational Awareness perspective
 - Feedback on ‘keep out’ areas,
 - Feedback on vehicle coverage capabilities
 - AUV survey coverage as a function of yo angle/depth vs speed vs battery vs ?
- [1] Sharing and annotation of draft plans and ‘what if’ scenarios
- [1] ‘The Plan’ submit ‘button’, makes the plan available as a layer on situational awareness display.
- [2] Planning for vehicles managed by shore-side autonomy (robot ballet)
- [3] Drifter projection, compact models, other tools to look a day in the future to simulate the plan.
- [0] CSUMB Capstone project as a ‘strawman’ visual calculator prototype to solicit user feedback

ODSS Planning – Campaign Timeline

- Campaign Timeline. Day plans submitted to ‘the plan’ for the extent of the campaign.
- Connection to DMO
 - Cruise Plan, expedition database
 - Ships schedule
 - Vehicle availability calender

CSUMB Planning Calculator 'proto'

http://freedflowers.com/mbari/mbaritest.php#

CANON Data Feed Suggested Sites Get more Add-ons

Find: glimpse Previous Next Options

Monterey Bay Aquarium Research Institute

Latitude: 36.92752756383849
Longitude: -122.02960995263674

trialAUV

Choose AUV Path Type:

☐ SQUARE ☐ RECTANGLE

Drag the icons to you desired location. Click on the two icons to make a comment and save to the database. Or enter longitude/latitude for both markers manually below:

Latitude 1:

Longitude 1:

Latitude 2:

Longitude 2:

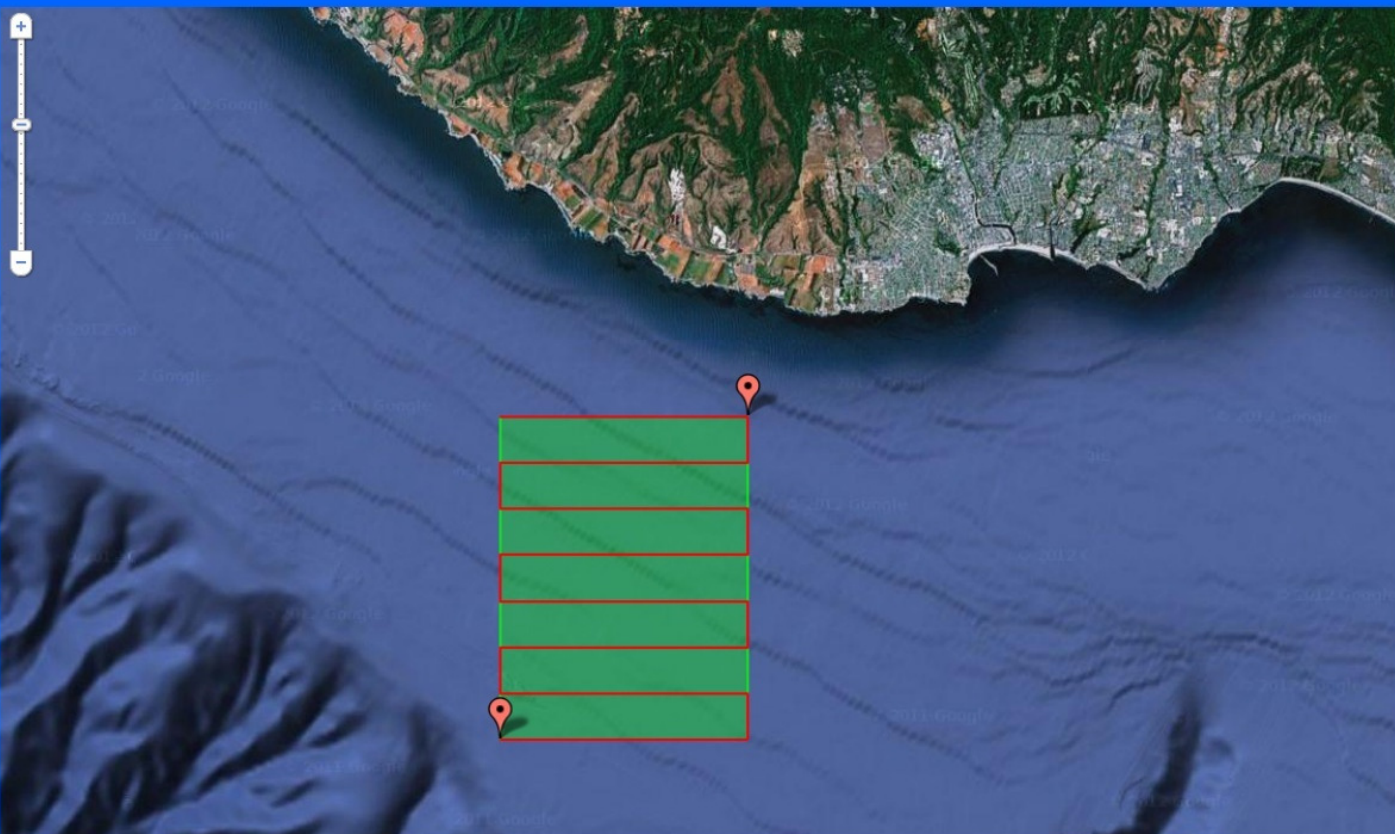
[Set Yo-Yo](#)

Now enter the depth, speed and number of turns for the AUV.

Depth (m):

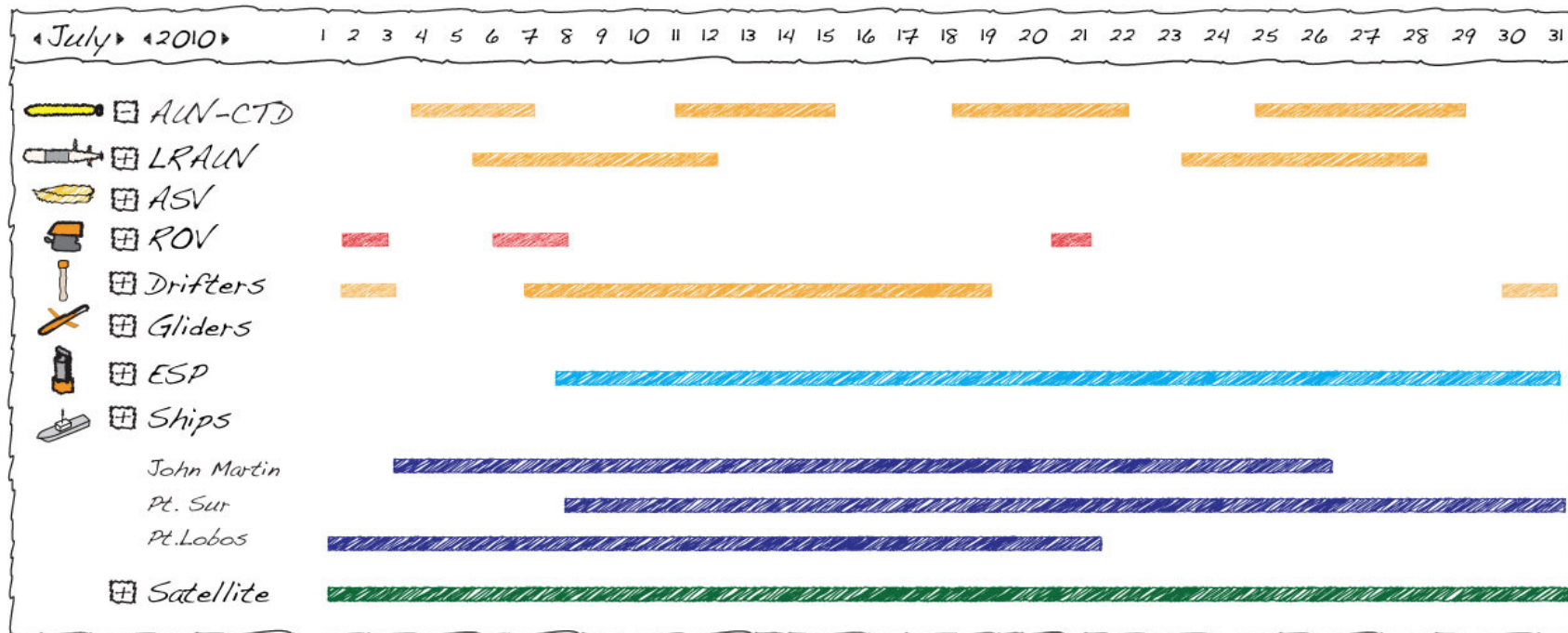
Speed (m/s):

Number of turns:



CANON Decision Support System

Asset Timeline



List of Experiments



Shore-side (server) Autonomy

- Communications Backplane provides connectivity to vehicles and data
 - AMQP
 - Google Protocol Buffers
 - STOQS-RT
- Drifter Tracking App – the ‘hello world’ of autonomy written in Java choreographed the robot ballet – AUV driving boxes around a drifter
- Rajan lab enabled for more sophisticated shore-side autonomy using TREN and Europa.

Observation Log

Observation Log / Tagging

- Log notebook, implemented in 2011 as a web application.
 - Used infrequently, need something better suited to the users
- 2012, CSUMB students produced prototype mobile applications built on ODSS web service
 - Support ‘poor connectivity’, use of email service on mobile device vs database
- Future: add email ingest of log observations
 - Bad formatting causes bounce back with instructions on formatting the email

CoSci

Collaborative Science Tools

- CoSci
 - Threaded email discussions
 - Data product sharing
- COOP
 - Chat and Voting
 - Data descriptions, access

Oceanographic Decision Su x Collaborative Ocean Obsen x moqua.gif (3150x2070) x

← → ↺ <https://odss.mbari.org/odss/> ☆ 🔧

Situational Awareness Planning Cosci Data Analysis Water Management

CANON Collaborative Science

Welcome Thom Maughan Logout

Discussion Data MyAccount Users

[Add topic](#)

- 2012 CANON discussion relevant, recent publication on fronts
 - 05/03 19:08 Julio Harvey I've placed a recent publicati ...
 - 05/03 20:04 Julio Harvey A number of people have noted ...
- CANON Spring Experimental Plan Updated [Add Post](#)
- ODSS Status Update for CANON PI Meeting 12 Apr 2012 [Add](#)
- CANON 2012 planning [Add Post](#)
- CANON experiment concluded [Add Post](#)
- Survey Dorado389_2011_263_00_263_00 processed [Add Pos](#)
- retasking today [Add Post](#)
- Dorado movie [Add Post](#)
- Survey Dorado389_2011_262_00_262_00 processed [Add Pos](#)
- Tuesday, update [Add Post](#)
- Tuesday [Add Post](#)
- CANON experiment plan, Monday 19 September [Add Post](#)
- LCS for today [Add Post](#)
- Survey Dorado389_2011_257_00_257_00 processed [Add Pos](#)
- Zephyr: Dorado / Wirewalker plan for Monday, 19 Sept. [Add P](#)
- LCS of the day [Add Post](#)
- Monday Martin Ops plus [Add Post](#)
- AUV - So far so good [Add Post](#)
- Survey Dorado389_2011_256_02_256_03 processed [Add Pos](#)
- Plan for today [Add Post](#)
- First 3 Tethys sections [Add Post](#)
- Tomorrow and Thursday [Add Post](#)
- Survey Dorado389_2011_255_00_255_00 processed [Add Pos](#)

[Reply](#) [Print](#)

Topic: 2012 CANON discussion relevant, recent publication on fronts

From: Julio Harvey

Date: Thu May 03 12:08:55 GMT-700 2012

Message:

I've placed a recent publication that relates upwelling front occurrence and chlorophyll concentrations to recruitment of barnacles, mussels and rockfish, in Monterey Bay and elsewhere:

[cifs://tomado.shore.mbari.org/ProjectLibrary/901009_CANON/2012_Discussion/Biblio/Woodson_etal_2012.pdf](https://tomado.shore.mbari.org/ProjectLibrary/901009_CANON/2012_Discussion/Biblio/Woodson_etal_2012.pdf)

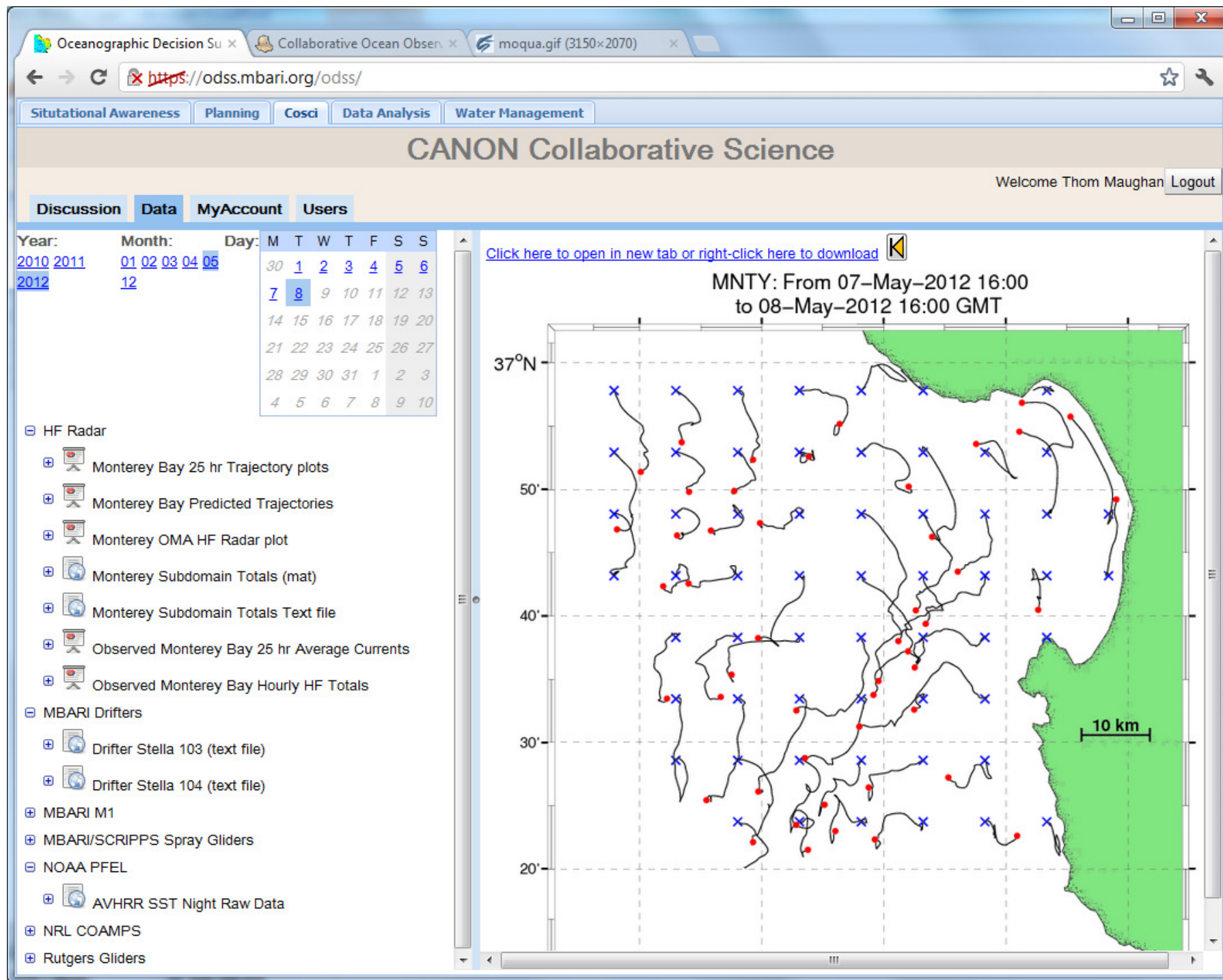
I feel that the value of linking oceanographic processes to realized, commercially important, biological output, cannot be overstated.

My hope is that this noteworthy effort (and similar work), will serve to spark discussion highlighting the importance of tying CANON activities, through the testing of specific hypotheses, to concrete scientific evidence, in support of process characterization across scales, resource management, or other efforts.

Julio

--

Julio Harvey, Ph.D.
 Monterey Bay Aquarium Research Institute
 7700 Sandholdt Road
 Moss Landing, CA 95039
 tel: 831.775.1789
 fax: 831.775.1620
 web: <http://www.mbari.org/staff/jharvey/>



Oceanographic Decision Su x Collaborative Ocean Observ x

https://aosn.mbari.org/coop/

Collaborative Ocean Observatory Portal

Observatory: ASAP [About the ASAP Observatory](#) Username: Password: [Log In](#)

Topic: 2006-08-30 Panes: 1 2 3 4 [link to this page](#)

Summary Links Discuss Live Docs Proposals Voting

2006-08-30 Summary

Updated 2006-08-30 13:29:35.0 by Steven R. Ramp [Previous](#)

2006-08-30 ASAP Experiment Summary

Schedule:	Teleconference Today, 12:00 PM PST / 3:00 PM EDT
System Status:	
Voting Results from Previous Day:	
Ocean Summary:	Gliders and daily-averaged CODAR show equatorward flow, especially in a jet turning offshore from AN. Some indication of a more complicated structure inshore of the jet near MBY. Glider ru06 samples this. Should get several more realizations from ru06 and Spray gliders. Proposed DORADO run will also cut across this feature.
Atmosphere Summary:	Winds are favourable for upwelling, but are not as strong as COAMPS predicted. Steady 15-kt winds from the NW should lead to another moderate upwelling event.
Hardware Summary:	No Dorado runs so far this week due to a combination of problems with the support vessel and AUV batteries. We are negotiating for a final Dorado run Thursday-Friday. Spray gliders heading in soon for pickup NLT Saturday morning. ADCPs and racom buoys to be recovered on Friday. Program is winding down!
Adaptive Sampling	Some Sprays will take up positions near Ramp ADCPs and act as "virtual moorings" to get glider ADCP/moored ADCP current benchmarks. DORADO to do more

Summary Links Discuss Live Docs Proposals Voting

ASAP Links

Updated 2006-08-31 14:14:40.0 by Fumin Zhang [Previous](#)

Dynamic Links	Interactive Links
General MB2006 Data Files (Thredds Access) ASAP Meteorology Page Observations Surface Currents (Regional Totals) NPS Data (Aircraft, ADCPs, Remus) Rutgers/CalPoly glider page SIO Spray glider Data Page WHOI Glider Data Page UW APL Seaglider Page (PlusNET) - Princeton Glider Coordinated Control System (GCCS) Glider Planner and Status (Results)	- Princeton Glider Coordinated Control System (GCCS) Trajectory Optimizer - MB2006 XBoard collaboration tool - MB2006 Science Organizer tool - MBARI AUV Path Planning Tool (Requires Java) Static Links ASAP Home Page MB2006 Page, MB2006 Seminars 2003 AOSN Page & 2003 AOSN Data Other Monterey Bay Data

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CANONJuneExperi....docx [Show all downloads...](#)

ODSS Data Analysis

ODSS Data Analysis Feature

- Initial draft of science user (DAC) requirements for the data analysis feature. In priority order:
 - [1] Basic: “What data is available and where is it”
 - Centralized Data Archive Description accessible through the ‘Data Analysis’ tab in odss.mbari.org. Provides access to files with descriptions.
 - Update descriptions and pointers with all the data gathered during the experiment should be complete by end of the experiment
 - Advanced: Query access to CANON data with browsing support (Matlab user is primary 'use case')
 - [1] users want to be able to make queries against the CANON data sets and access the data via Matlab
 - Users want to be able to browse the CANON data sets based on space, time and instrument.
 - [1] Support Matlab users as the first step. Access would follow the NC Toolbox usage model.
 - [2] Data browsing with access queries generated in a GUI tool such as MOQuA
 - “Consistent” data access method across CANON data sets
 - Require login to access data
 - Embargo supported
 - Data citation obligation associated with the data
 - Notification on data updates
 - Integration of LRAUV

ODSS Data Analysis Feature (cont'd)

- Basic Access:
 - Find data using Data Archive Description – confluence page with descriptions and web links
 - Data stored in file system (“consistent”: centralized file system, minimize different file types, standardize file types)
 - Provision for quality control of data – how will data processors document QC issues and QC status
 - Password protect embargoed data
 - [1!] Protect data from inadvertent delete
 - Data archive description documents data citation obligation
 - Documentation for data producers on guidelines for producing data and storage
- Advanced Access:
 - Browse data using a GUI that builds a database query,
 - that can be used in Matlab or R
 - Or provides files containing the data selected via the GUI
 - Data is stored in databases
 - Embargo supported in the database with required authentication
 - Automated embargo control via database tools and science policy
 - Integration of Moqua and STOQS.
 - The idea is to provide a data browser (‘DJ the Data’) as a means to provide efficient access spatio-temporally, with vehicle tracks, water samples and available contextual data sources
 - Provide browse / query support for data that does not fit the STOQS model

Basic Access

- Confluence pages with data descriptions and pointers to data organized by field campaign
 - Updated, reviewed and complete by experiment end.
- Protections against file deletion on FTP site
 - Change file (not directory) permissions to read-only by experiment end
 - Directory listing (manifest) as a text file with descriptions. Create a document and train the science data providers on good form.
- Change notification
 - RSS feed
 - Email notifications (maybe)
- Analytics: Page Access counter

ODSS Data Analysis Feature – Advanced Access

- [1] Matlab use case (commandline in Matlab)
 - Help on data access tool is available (like nctoolbox)
 - User is able to open a connection to stoqs to get access to all CANON data
 - User is able to discover what data types (platforms, instruments, measurements, etc) are available
- [2] all CANON 'in-situ' Data is stored in databases. Data loaders, data format and structure are the challenge.
- Science users are educated on how to produce netcdf to ease the database load effort. Documentation and guidance on confluence.
- [2] Embargo supported in the database with required authentication
 - Automated embargo control via database tools and science policy
- Citation requirement and contact 'somehow' brought to data user.
- [2] Browsing available data and help forming queries. Integration of Moqua and STOQS.
 - The idea is to provide a data browser ('DJ the Data') as a means to provide efficient access spatio-temporally, with vehicle tracks, water samples and available contextual data sources

Oceanographic Decision Su x Collaborative Ocean Obsen x

← → ↻ <https://odss.mbari.org/odss/> ☆

Situational Awareness Planning Cosci **Data Analysis** Water Management

Dashboard > CANON Data > ... > ODSS Data Analysis > CANON Data Archive Descriptions Search

CANON Data Archive Descriptions

Welcome [Maughan, Thom](#) | [History](#) | [Preferences](#) | [Log Out](#)

View Edit Attachments (0) Info [Browse Space](#) [Add Page](#) [Add News](#) [Add UI Mockup](#) [Add Diagram](#)

Added by [Maughan, Thom](#), last edited by [McCann, Mike](#) on Apr 22, 2012 ([view change](#))

Labels: (None) [EDIT](#)

Link to this page: <https://ocean.mbari.org/confluence/display/CDATA/CANON+Data+Archive+Descriptions>

[Back](#)

CANON Data Archive List by Field Campaign (testing RSS feed, anonymous, to Google Reader)

[STOQS data load script for all campaigns](#)

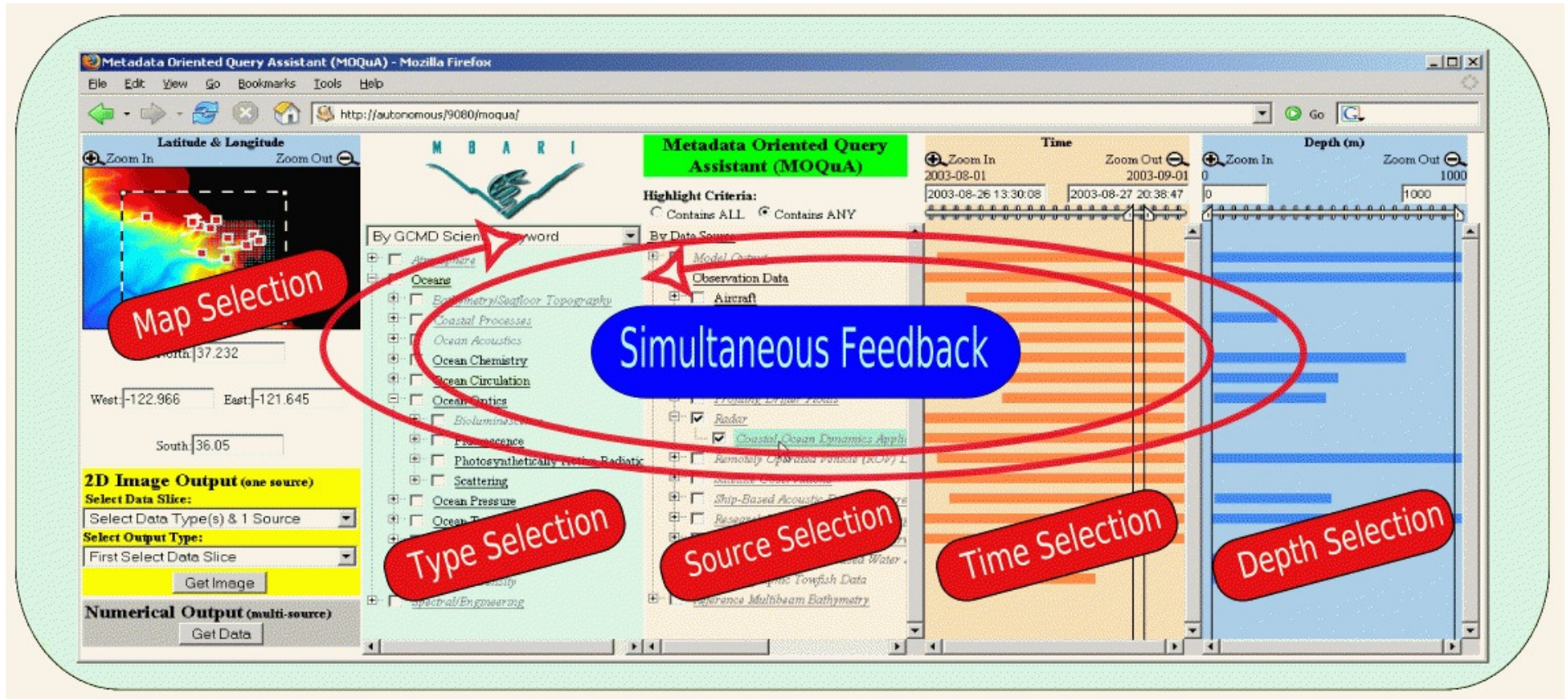
Link	CANON Experiment 'Field Campaign' Description
2010 September	Western Flyer, Zephyr, ESP Drifter outside of Monterey Bay
2010 October	BloomEx, BioSpace, and LatMix in Monterey Bay
2011 April	Bloom dynamics along frontal regions in Northern part of Monterey Bay
2011 June	Bloom dynamics along frontal regions in Northern part of Monterey Bay
2011 September	Bloom dynamics (needs to be confirmed) along frontal regions in Northern part of Monterey Bay
2011 October	Western Flyer, ESP Drifter
2012 May	Western Flyer, Zephyr, Dorado+Gulpers, LRAUV, Gliders (Genetics tools used from bacteria to zooplankton)

Children [Hide Children](#) | [View in Hierarchy](#) | [Add Child Page](#)

- [CANON 2010 Oct MB Data Archive Description](#)
- [CANON 2010 Sep MB Data Archive Description](#)
- [CANON 2011 Apr MB Data Archive Description](#)
- [CANON 2011 Jun MB Data Archive Description](#)
- [CANON 2011 Oct MB Data Archive Description](#)
- [CANON 2011 Sep MB Data Archive Description](#)
- [CANON 2012 May MB Data Archive Description](#)

[Add Comment](#)

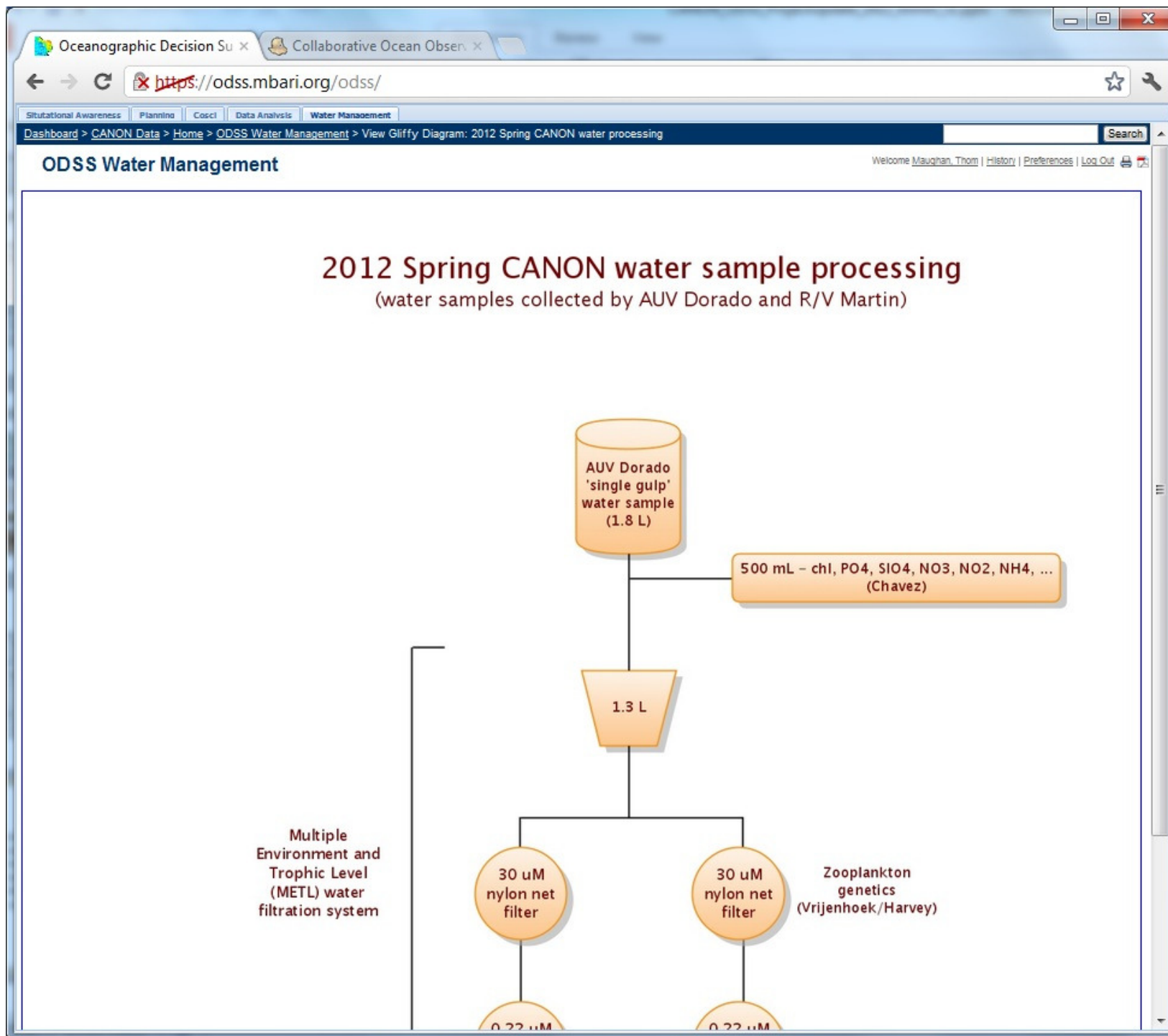
MOQUA + STOQS – “DJ the Data”



STOQS – Spatial Temporal Oceanographic Query System

Water Management

- [1] Implemented as a confluence page updated by science user with support from engineering
 - Graphically shows the water sample management plan
- Future plans include things like
 - Track sample locations
 - Track sample processing and results
 - Connect water samples shown in ODSS situational awareness playback to information about the water sample status and location.
 - Improve support in the ODSS for ‘which water samples to invest expensive processing’



Services

User Web Services

- Drifter Finder – text based or lightweight map based locations optimized for low/poor comms at sea
- Logging Service for mobile apps / observation log

Add New Platform

- [1] first draft of procedure / checklist on confluence documenting the tasks for adding a platform – communications and data management plan
- [1] Platform list for Sept 2012
 - Western Flyer
 - LST
 - LRAUV (2)
 - Dorado
 - Zephyr
 - Drifting ESP – mooring and ESP are both data sources

Shore-Side Autonomy

- Drifter Tracking App
- Integration and support for shore-side TREN (Distributed Autonomy research)

Development Timeline

- 2010 Feasibility study, first prototype
 - Feasibility study – pencil sketches, high level requirements gathering
 - First prototype leveraging USC grad student Jnaneswar Das (JD) – 6 weeks effort leveraging a web app base
- 2011 Second prototype
 - Carlos Rueda, 4 week effort to look at viability of candidate software – SmartGWT, GWT, Open Layers
 - Danelle Cline GUI
 - Kevin Gomes, Web Services, Comm Backplane
 - Mike McCann, Database, Web Services, Comm Backplane
 - Tom O'Reilly, Comm Backplane,
- 2012 Start on Production tool
 - 20% on Bug fixes (rip out SmartGwt, implement in Javascript)
 - 20% on Planning prototype
 - 60% on Data Analysis perspective with feedback and requirements determined by the DAC
- 2013 Finish ver 1.0 of Production ODSS

Backup slides

CSUMB iOS App (iPhone,iPad)

raphic Decision Su x iSciLog for iPhone 3GS, iPhone 4 x

itunes.apple.com/us/app/iscilog/id517336773?mt=8

iSciLog

By WcmBuilders

Open iTunes to buy and download apps.

[View More By This Developer](#)



[View in iTunes](#)

+ This app is designed for both iPhone and iPad

Free

Category: [Education](#)
Released: May 10, 2012
Version: 1
Size: 2.5 MB
Language: English
Seller: william murphy
© wcmbuilders
[Rated 4+](#)

Requirements: Compatible with iPhone 3GS, iPhone 4, iPhone 4S, iPod touch (3rd generation), iPod touch (4th generation) and iPad. Requires iOS 5.1 or later.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

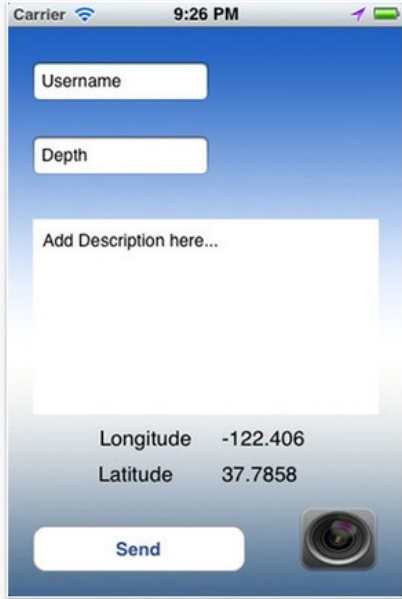
Description

This is the first version of the logging system at MBARI. Use this application to log your observations.

[iSciLog Support](#)

Screenshots

iPhone | iPad



ODSS Engineering Status 12 Apr 2012

Requirements Definition: ODSS Data Analysis Feature

- Initial draft of science user (DAC) requirements for the data analysis feature. Done.
- In priority order:
 - “What data and where is it” Centralized Data Archive Description accessible through the ‘Data Analysis’ tab in odss.mbari.org. Provides access to files with descriptions.
 - Query access to CANON data with browsing support (Matlab user is primary 'use case')
 - users want to be able to make queries against the CANON data sets and access the data via Matlab
 - users want to be able to browse the CANON data sets based on space, time and instrument.
 - we are planning on supporting Matlab users with the first offerings. Queries generated in a GUI tool such as MOQuA
 - “Consistent” data access method
 - Embargo supported
 - Data citation obligation associated with the data
 - Notification on data updates
- Basic Access:
 - Find data using Data Archive Description
 - Data stored in file system (“consistent”: centralized file system, minimal file types)
 - Password protect embargoed data
 - Data archive description documents data citation obligation
- Advanced Access:
 - Browse data using a GUI that builds a database query,
 - that can be used in Matlab or R
 - Or provides files containing the data selected via the GUI
 - Data is stored in databases
 - Embargo supported in the database with required authentication
 - Automated embargo control via database tools and science policy

Development Status

- ODSS Data analysis
 - STOQS provide access in-situ data sets, both NetCDF and some non-NetCDF data such as is in the BOG database.
 - For NetCDF data, the THREDDS data server provides another means to access data. THREDDS can aggregate across NetCDF data provided certain conventions are followed in the NetCDF file.
 - LRAUV data management integration is planned this way
 - MOQuA is being explored as a GUI for query building
 - Mike Godin is investing two to three weeks integrating MOQuA on top of STOQS leveraging GUI test code written for STOQS by a contractor (i.e. get data button makes access to STOQS, which returns the data)
 - Evaluating backend of ESP GUI as model for implementing a consistent file system
- ODSS Situational Awareness Perspective
 - Ripped out problematic SmartGWT ; have validated new version on IE, Chrome, Firefox, and Safari.
 - Lean/mean maintainable implementation planned to roll out in second half of April.
 - Working with Kanna's team to plumb in Smart Sampler to get Gulper positions in ODSS Situational Awareness Display
 - Mitigating amount of data flowing from shore to ship during September off-shore experiment
- ODSS Planning Perspective
 - CSUMB Capstone project provides a 'proof of concept' that we can play with and use to gather requirements for what we'd like in ODSS – demo scheduled for April 19 12:30-1:30PM
- ODSS Observation Log
 - ODSS team built a log web service and the CSUMB students have built mobile apps (iPhone and Android) for entering log information.

STOQS: Spatial Temporal Oceanographic Query System <http://code.google.com/p/stoqs/>

MOQuA: Metadata Oriented Query Assistant <http://www.mbari.org/mb2006/moqua/>

CoSci: Collaborative Science portal NetCDF: Network Common Data Format <http://www.unidata.ucar.edu/software/netcdf/>

THREDDS (Thematic Realtime Environmental Distributed Data Services) <http://www.unidata.ucar.edu/projects/THREDDS/>

[1] Situational Awareness

“Make existing features work well”

- [1] ‘Hit Refresh’ on browser and all platform tracks paint within 3 to 5 seconds
- Show an ‘active’ map of the experiment region
 - [1] Real Time platform position and tracks
 - Platform track enable/disable
 - Platform position in text (copy and paste-able)
 - [3] Sensor Tracks
 - low res sensor data as track color for mobile assets sending sensor data (AUV, Waveglider, LRAUV, gliders).
 - Sensor tracks can be implemented as transparent image overlay. Sensor tracks can be ‘hard coded’ to one sensor and option to allow user selection removed if needed for performance reasons.
 - [2] Gulper locations from Dorado – gulper info sent from TREX through comm backplane is displayed ‘real time’ on ODSS
- ‘Decision data’ transparent overlays
 - [1] fixed hard coded list of remote sensing / data products
 - [3] Future: we want to allow individual users to select which data products will be displayed
 - [1] ‘age’ of data product
- Asset plan vs actual (next ‘box’ along with actual track)
 - [2 tbd] Shore based autonomy projections
 - [2] Improve the ‘actual’ so that it shows the AUV track and not the surface position reporting
- Playback animation
 - [1] Fix unbearable slowness
 - [2] Water sample locations
 - [1] Work with Danelle and Mike M on backend optimizations for playback and sensor tracks (as needed)

[2] ODSS Planning

- CSUMB Capstone project as a 'strawman' prototype
- Data selection inherited from Situational Awareness perspective
- Visual representations of proposed vehicle plans.
 - Feedback on 'keep out' areas,
 - Feedback on vehicle coverage capabilities
 - AUV survey coverage as a function of yo angle/depth vs speed vs battery vs ?
- Ability to save and share plans with others, use of coop-like chat to discuss reasons behind plans and voting and adoption of 'The' plan
- Drifter projection, compact models, other tools to look a day in the future

[1] Data Analysis prospective

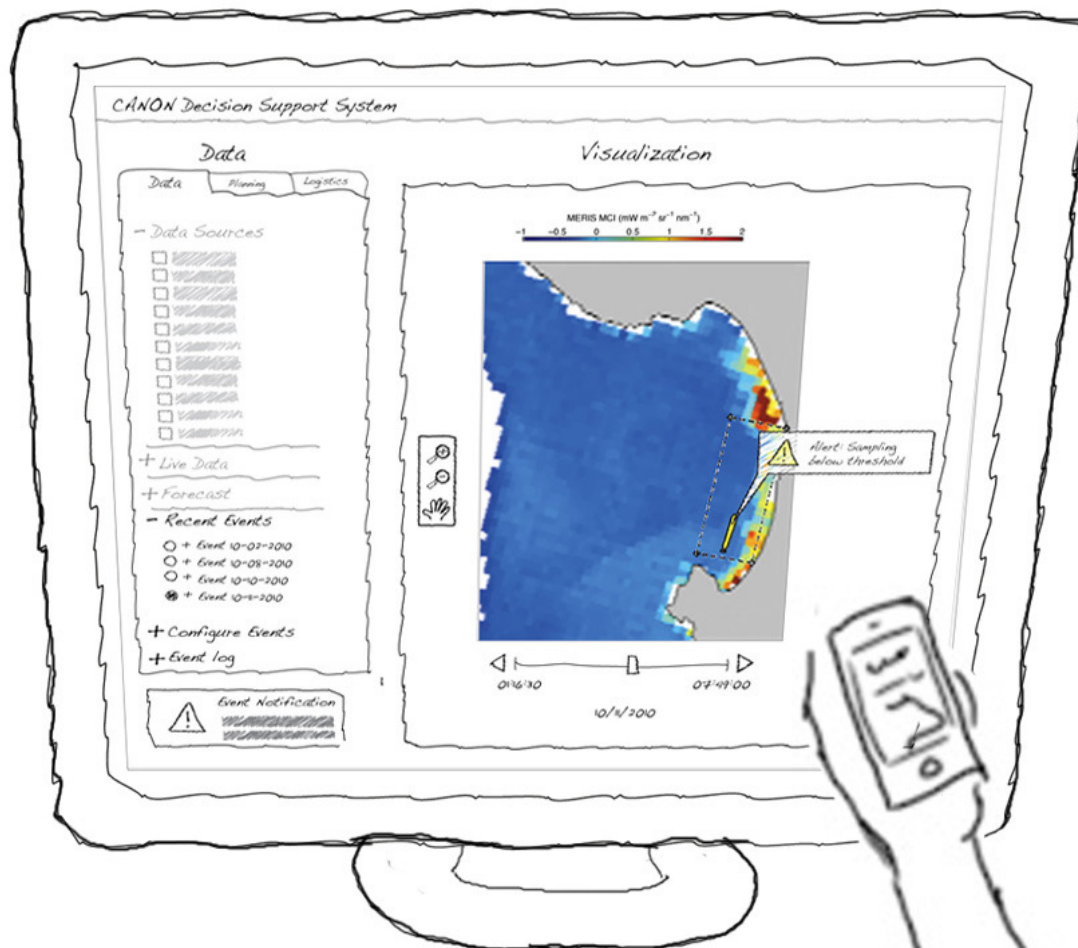
- [1] Engineering will act on user requirements that are defined based on working with the DAC
 - Proposal was discussed to focus on a dataset, DAC needs to specify the data set. (proposal is on the table for Oct. 2010 BloomEx/BioSpace dataset)
- [2] Tactical tasks to address lessons learned in 2011
 - Mike is working to put the CANON data (Sept, Oct 2010, Apr, Jun, Sep 2011) into STOQS. This data would be the in-situ data from Tethys, Dorado, Mooring, Martin,
 - Estimate provided by Mike is ~4 weeks, unclear what affect refactoring STOQS will have on providing CANON data down the road.
- Strategic direction is being managed by the CANON lead engineer with the idea that experiment planning is the backbone to extract the requirements for the Data Analysis perspective

Data Analysis – other thoughts

- Previous Ideas discussed in 2010/2011:
 - Previous plan was a GUI interface to ‘DJ the Data’ as a means to provide efficient access spatio-temporally, with vehicle tracks, water samples and data sources.
 - Something along the lines of MOQUA with some enhanced map time controls with the get data button implemented on STOQS
 - Smart Sampler framework to enable automated search, tagging and algorithm development
 - Automating the oceanography report
 - In general, automating relevant Matlab scripts

ODSS Planning

- Visual representations of proposed vehicle plans
 - Feedback on 'keep out' areas,
 - Feedback on vehicle coverage capabilities
 - AUV survey coverage as a function of yo angle/depth vs speed vs battery vs ?
- Drifter projection



Decision Support – Directions

- Automated event detection, notification
- Planning service – automated ‘keep out’ for shore side autonomy
- Event response operational scenarios
- Shore-side autonomy (“robot ballet”)
- Shore side model of the Ecosystem (Organism) reference frame
- Dynamic sampling protocols
- Add new platform
 - Current situation is ‘ftp site’
 - First class data management for platforms and models
- Data Analysis: Data Access for Analysis tools

Thank-you and Acknowledgements

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- MBARI engineering, science and marine operations
- CANON scientists