



Autonomy Project Plans for 2010

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2010 Project Proposal Summary

- The project is fully aligned with **CANON** (Controlled, Agile and Novel Observing Network <http://www.mbari.org/canon/>)
 - “*CANON is....intensive process-driven, ecologically-oriented field experiments utilizing a multi-platform, multi-disciplinary approach*”
 - Shore-side autonomy to augment onboard adaptation to direct vehicle(s) to stay track, stay and return microbial samples from a patch of water. Initial focus on HABs.
 - Adaptive sampling to decide where to position one or more assets and then to decide what to do with the vehicle in the vicinity of the target area.
 - CANON = Bellingham, Chavez, Rajan, Ramp, Ryan, Scholin, Vrijenhoek, Worden
 - Meetings are every other Tue @ 10am starting Jan 5th in
- **Requirements discovery**
 - Sampling survey requirements (i.e how to sample appropriate for the needed resolution of the phenomenon)
 - Work with other CANON PIs to scope out microbial sampler design requirements
 - Gulper is insufficient since microbial RNA cannot survive long transit times and dynamics of Gulper actuation
 - Above will drive onboard and offshore adaptation
- **Decision Support tools for CANON**
 - Where and when to place an asset to sample at the right place and time.
 - Dynamics of HABs require on-station presence and adaptation.
- **Simulation and Modeling**
 - To drive coordination, we need to get a more realistic simulation environment which can be used by shore-side tools.
 - Simulation to drive both vehicles in a synthetic ocean, as well as to incorporate time-varying physical and biological ocean model outputs (submitted NSF proposal)

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Expected Deliverables

- **Requirements discovery**
 - Preliminary design document for sampling
- **Decision Support tools for CANON**
 - Model synthesis (biological, physical and advection)
 - Agglomeration of above to provide tools/techniques to allow scientists on shore to determine where/when we place an asset
- **Simulation and Modeling**
 - Synthesis of model outputs
 - Integration of synthetic modeling for AUV simulation



Revision 2

2010 Project Zephyr time R/V Zephyr
2010 Schedule

12/10/2009

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
JAN	F	SA	SU	M	TU	W	TH	F	SA	SU	M	T	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	JAN	
Zephyr													Kelley												Rock	Kelley	Rock				Clague	Zephyr	
Other																																Other	
Vessel																																Vessel	
FEB	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	T	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU				FEB	
Zephyr	Clague (7) 24-hr days															Pauli (5) 24-hr days									Clague 24-hr								Zephyr
Other																																Other	
Vessel																																Vessel	
MAR	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	MAR	
Zephyr	Clague (7) 24-hr days															Rock	Rajan	Rajan	Rajan				Pauli (5) 24-hr days										Zephyr
Other																																Other	
Vessel																																Vessel	
APR	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	APR		
Zephyr	Maint											Maint	Mob	ESP	Kelley					Ryan	Ryan	Ryan	Ryan				Mob	Chavez	Rock	MOOS	Zephyr		
Other																																Other	
Vessel																																Vessel	
MAY	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	MAY	
Zephyr								Smith / Pelagic Coupling (7) 24-hr					Maint				Mob	Chavez	Kelley	ESP				Rajan			Rajan	Rajan		Zephyr			
Other																																Other	
Vessel																																Vessel	
JUN	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W		JUN	
Zephyr	SRV							SRV			Chavez				Mob	ESP	Kelley	Mob				Ryan	Ryan	Ryan	Ryan				Ryan	Ryan	Ryan	Zephyr	
Other																																Other	
Vessel																																Vessel	
JUL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	JUL	
Zephyr	Ryan							Maint	Maint				Chavez	ESP	Barry	Barry				Rock	Hobson	Hobson					Kelley				Zephyr		
Other																																Other	
Vessel																																Vessel	
AUG	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	AUG	
Zephyr							Chavez				Hamilton	Hamilton	Kelley	ESP										MOOS					Kelley	Chavez		Zephyr	
Other																																Other	
Vessel																																Vessel	
SEP	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH		SEP	
Zephyr		ESP						Hamilton	Hamilton	Mob			Ryan / Canon (7) 24-hr					Maint	Maint	Rajan	Rajan							ESP	Kelley	Mob		Zephyr	
Other																																Other	
Vessel																																Vessel	
OCT	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	OCT	
Zephyr					Ryan	Ryan	Ryan	Ryan				Ryan	Ryan	Ryan	Ryan				Ryan	Ryan	Ryan	Ryan				Ryan	Ryan	Ryan	Ryan			Zephyr	
Other																																Other	
Vessel																																Vessel	
NOV	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU		NOV	
Zephyr	Chavez		Rajan	Rajan						Pauli	Pauli	Maint				Hamilton	Hamilton	Kelley	ESP				Maint	Maint	Maint					Hobson	Zephyr		
Other																																Other	
Vessel																																Vessel	
DEC	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	SA	SU	M	TU	W	TH	F	DEC	
Zephyr	Safety Day	Chavez					Ryan	Ryan	Ryan	Ryan				Johnson	Johnson	Johnson	Johnson				Kelley	Hobson		Maint			Maintenance				Zephyr		
Other																																Other	
Vessel																																Vessel	
Legend:																																	

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Other Potential Collaborations

Gabriel Elkaim, UCSC Computer Eng

- Students, Autonomous Surface Vessel



Alberto Elfes, JPL Robotics

- Autonomous airship, expertise in Information-theoretic control
- Can bring limited JPL funds to participate in field experiments



Distributed
Autonomy

Gaurav Sukhatme, USC Robotics

- Student, postdoc, expertise in adaptive sampling
small scale marine robotics, Caron collaborator

Supplemental Proposals

- NOAA ECOHAB (with UCSC Ocean Sci, USC Biology, Robotics & Scholin)
- NSF (with USC Robotics)

Raphe Kudela, UCSC Ocean Sci

- Postdoc Anderson and PhD student Long associated with ECOHAB proposal + aided NSF proposal for biological modeling

Other:

- GREX multi-vehicle control at IFREMER/LAAS will use T-REX. PhD student of collaborator visited MBARI for 3 months
- Doug Horner/NPS interested in bringing 2-3 REMUS vehicles with own funds

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Output for today

- Determine timelines for wrapping up 2009 commitments
 - Monte-Carlo/Fast Sim + Ocean Modeling interfaces and code (BR)
 - Behavior stack status output (TOR)
 - Status of AUV QNX code merge (HT)
 - Evaluate impact from AUV Linux switch
- Determine how to interact with other CANON-folk for requirements generation
- Determine survey requirements and impact on T-REX development
- Determine how to connect ROMS (or ROMS-like) inputs to AUV Linux Sim
- Target conference travel and coordinate with Eng. for support
 - MTS/Oceans, Seattle
 - ASLO/Ocean Sciences, Portland
 - ICRA, Anchorage
 - AAMAS, Toronto
- Determine vacation/travel timelines