

- Statement of Problem (why important)
 - Why
 - To understand oceanic ecosystem in changing climate.
 - To understand the cycling of carbon from production at surface to benthos below.
 - To understand how ocean sequesters CO₂
 - MBARI in unique position to give full view of water column and unique funding structure to provide this understanding.
 - Goals:
 - Integrate 3 time series into one
 - Integrate data both scientifically and technically
 - Each of the three time series is moving to lessen dependency on ship (more autonomous systems)
 - Benefits
 - Increase scientific impact.
 - Organic carbon could be tracked through column to allow interpretation of climate change
 - Define metrics for ocean ecosystem health to be used by resource managers
 - Develop understanding of lagged relationships that will help for future predictions
 - Builds on an already important time series
 - Increase efficiency
 - Reduce costs
- Connect to MBARI Strategic Plan
 - Existing text
- Connect to Packard Foundation Ocean Vision Grant Making
 - Existing text
- Connect to Technology Roadmap
 - Existing text
- Approach
 - Goals of project (Francisco's text)
 - Short term
 - Continue successful partnership between three labs
 - Define and refine the scientific requirements for MBARI ocean time series from the surface ocean to the benthos (2015) (*Feedback #3*)
 - Timely processing of existing and future data sets to elucidate patterns
 - Reduce cost of conducting time series measurements
 - Increase the temporal frequency of time series measurements
 - Define and promote the technologies needed to make the time series sustainable and exportable.
 - These will be carried out under 3 individual time series
 - Integrate data from three time series
 - Scientifically
 - seek to answer questions
 - Technically
 - Develop data integrated in common storage
 - Develop access mechanisms to that data
 - Develop exploration tools (visualization) of that data
 - Long term
 - Create affordable, sustainable system that allows for monitoring of ecosystem health and key processes and their impact on climate variability as driven by climate change
 - Create system that improves prediction capabilities of oceanic processes under climate change
 - FIGURE 1 - Monique's flow diagram
 - FIGURE 2 - Mariah's 'end game' diagram

- Feasibility study results
 - Define parameters to be sampled
 - What technologies needed to acquire samples
 - Long endurance and range AUV that can be configured for use in three time series
 - Cataloging of existing data in time series programs
 - Early development of scientific analysis of data and integration
 - Prototype of storage, access and visualization software
- Proposed Work
 - Monthly meetings (existing text)
 - Science and data integration (existing text)
 - Technical data integration (existing text)
 - Focused solution while consulting with TAG to provide bridging?
- Project relationships and dependencies
 - THE FIGURE(S) (TBD) with supporting text (**Feedback #4**) (**Feedback #5**)
 - Monterey Bay Time Series
 - LRAUV development
 - LRAUV Sample (CANON)
 - 3G ESP on LRAUV (ESP)
 - Midwater Time Series
 - i2Map vehicle
 - Benthic Pelagic Coupling
 - Increasing endurance
- Impacts
 - DMO (**Feedback #1**)
 - Data collection, processing, query (**Feedback #2**)
- Research Activities
 - Monique's (**Feedback #7**) (**Feedback #8**)
- Engineering/Technology Development
 - Work with machine learning groups to define access requirements (**Feedback #9**)
 - Define access interfaces for integrated data
 - Work with project team and data analyst (Monique) to define exploration/visualization requirements
 - Design/select common data storage to support access and visualization requirements
 - Work with Data TAG to understand linkages to possible technologies (**Feedback #6**)
 - Develop automated data extraction from existing time series into common data store
 - Develop/deploy common data storage technology
 - Develop access software
 - Develop exploration/visualization software
- Deliverables
 - Access interface requirements
 - Exploration/visualization requirements
 - Data store selection
 - Data store deployment
 - Extraction deployment
 - Access interface deployment
 - Exploration/visualization deployment
- Budget
 - Matlab toolbox
- Project Team
 - Existing
- Lab Space
 - None
- Data Availability
 - Through access, exploration and visualization interfaces
- Risk Matrix

1. What assets and staff will be needed for end goal and what is impact on DMO?
2. What is the impact on data collection volumes and analysis?
3. Provide comprehensive understanding of requirements from sensor to dissemination before actually building hardware on sub-projects
4. Should have pilot scale experiments geared at informing long-term plan
5. Provide overall systems summary of efforts to show how all fit together with project (table or diagram)
6. Work with Data TAG and provide analysis of projected storage/processing/querying needs.
7. Address how system will include capability to improve prediction and allow for hypothesis testing.
8. Define the near term science objectives
9. Address how you will provide a machine learning interface (particularly with genomic data). Consider PNNL and Francine Berman as resources