

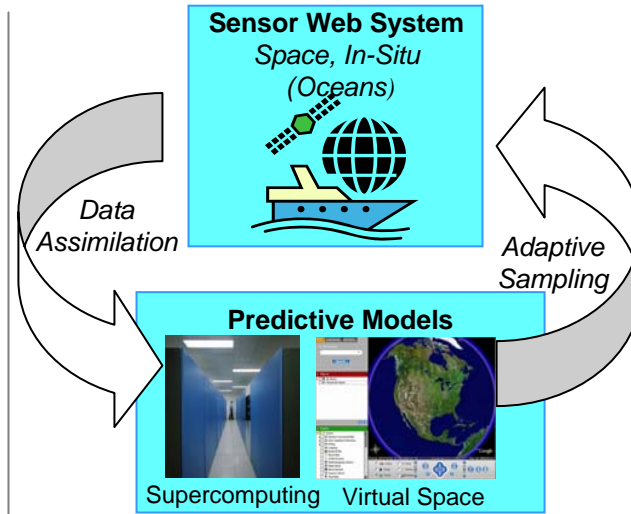


A Smart Sensor Web for Ocean Observation: System Design, Modeling, and Optimization

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Objectives

- Design, develop, and test an integrated satellite and underwater acoustic communications and navigation sensor network infrastructure and a semi-closed loop dynamic sensor network for ocean observation and modeling. This first-of-its-kind sensor network will incorporate features such as reconfiguration of sensor assets, adaptive sampling and autonomous event detection, targeted observation, location-aware sensing, built-in navigation on mobile nodes (Seagliders), and high-bandwidth, high-power observation on cabled seafloor and stationary nodes (mooring systems with vertical profilers).
- Perform science experiments in Monterey Bay, enabled by such a network, and evolve them to growing levels of sophistication over the 3-year period of performance.



The task will have strong tie-ins with the NASA satellite oceanography and ocean science community, in charge of carrying out new experiments which will overcome limitations in current approaches.

Semi-closed loop dynamic smart ocean sensor web architecture

Approach

- Develop a comprehensive acoustic sensor network architecture, engineering model, and telecom protocols, including features and evaluation performance metrics.
- Develop a full and accurate software simulation environment, incorporating network element models, and the developed protocols.
- Perform laboratory tests and ocean sensor web data collection experiments.
- Develop the interface between the ocean smart sensor web and the Regional Ocean Modeling System (ROMS) predictive model, operate it in near real-time, assimilating acoustic measurements.

Key Milestones

Milestone	Months after task start
Prepare satellite sensor data for Monterey Bay	6
Software demonstration of 2-element network	12
Architecture description document	12
Test and refine the ROMS prediction	18
Develop MAC and network layer protocols	20
Full-scale software demonstration, modeling of network elements, and a 4-element network	22
Ocean sensor web experiments at Monterey Bay	28
Demonstration of first prototype of integrated satellite/acoustic sensor network	28
Complete science data analysis from field demonstration.	35

Co-I's/Partners

- Andrew Gray (AGCI Inc), Yi Chao (UCLA/JPL)
- Sumit Roy, Bruce Howe, Warren Fox / Univ. of Washington

TRL_{in} = 3

