ESRI Oceans Summit 2012 – Position Paper for PacIOOS

Richard "Abe" Coughlin
rac88@hawaii.edu
+1-808-956-0822
2525 Correa Rd, HIG503
Honolulu, HI, USA, 96822

About PacIOOS

The Pacific Islands Ocean Observing System (PacIOOS) is one of eleven Regional Associations (RAs) comprising the coastal component of the U.S. Integrated Ocean Observing System (IOOS).

The PacIOOS region includes the U.S. Pacific Region (Hawaii, Guam, American Samoa, Commonwealth of the Northern Mariana Islands), the Pacific nations in Free Association with the U.S. (Republic of the Marshall Islands, Federated States of Micronesia, Republic of Palau), and the U.S. Minor Outlying Islands (Howland, Baker, Johnston, Jarvis, Kingman, Palmyra, Midway, Wake).

About IOOS

The Integrated Ocean Observing System (IOOS®) is a partnership among federal, regional, academic and private sector parties that works to provide new tools and forecasts to improve safety, enhance the economy, and protect our environment.

IOOS supplies critical information about our Nation's oceans, coasts, and Great Lakes. Scientists working to understand climate change, governments adapting to changes in the Arctic, municipalities monitoring local water quality, and industries affected by coastal and marine spatial planning all have the same need: reliable, timely, and sustained access to data and information that inform decision making.

Ocean GIS Issues of Concern for PacIOOS

Oceanographic data is widely accessible but few users know how to fully use it. Also, GIS applications are not designed to work with the changing, multidimensional, multivariate data. Users need to be made aware of the data, how to import this data into standard GIS applications and how to incorporate this data into their analyses, plans and management. GIS applications need to expand their development to incorporate this data into analysis routines and cope with the increased computation required. This may require absorbing some external applications or building plug-ins like the ASA's Environmental Data Connector (EDC) for ArcGIS.

The importance of real-time data incorporated into spatial management or planning tools also has to be highlighted. Rather than rely upon a map drawn up 6 months ago, even based upon a model for the future, does not circumvent issues that can be identified today through real-time or near-real-time data.

Visual representation of multidimensional data needs addressing also. There are 3D displays and 3D caves but further consideration has to be given to the standard user employing multidimensional oceanographic data and how they see and interpret the data.

PacIOOS Focus Areas

PacIOOS has focused initial development on water quality sensing, prediction of coastal hazards, ocean state observations, marine ecosystem information, ocean models, and the development of integrated data access and visualization capabilities.

Water Quality
Automated sensing of water quality parameters has been identified as a high-priority focus within each of the PacIOOS jurisdictions. To assess water quality we have deployed an observational network of cabled platforms, autonomous underwater vehicles and coastal moorings in Hawaii and have deployed additional cabled platforms in each of the jurisdictions within PacIOOS. An initial map based water quality visualization has been developed for Waikiki and will be used as a template for regional expansion.

Coastal Hazards and Resiliency
The coastal margins of the Pacific Islands are vulnerable to both long-term and episodic changes in coastal water levels and accurate forecasting of these changes has been identified as a common priority among all PacIOOS jurisdictions. Observing systems are in place to assess sea-level rise and long-term sea level variations for the region; however the local communities have expressed a need for the prediction of short-term, high-water level events.

Ocean, Beach and Harbor Conditions
PacIOOS currently operates the initial components of an operational network of high-frequency radios (HFRs), ocean gliders, wave buoys, coastal ocean and harbor moorings, and numerical models to produce to most accurate information possible. HFRs are operational on the south shore of Oahu and provide maps of surface currents up to 30 miles offshore. In collaboration with CDIP 5 Datawell directional wave buoys are deployed in the ocean waters of Hawaii, Guam and the Marshall Islands. Harbor monitoring systems are in place at Barbers Point and Kaumalapau, providing needed information to mariners, harbormasters, and those engaged in the Hawaii Harbor Modernization Program.

Marine Ecosystem Monitoring and Information
SOEST is a partner in the Ocean Tracking Network and helps support an array of acoustic receivers that span the Hawaiian Archipelago. These receivers monitor the presence of fish, and data collected from this system is used to describe patterns and behaviors of fish, improve estimates of population size and better inform local agencies about public safety issues regarding sharks.

Modeling
Four modeling systems (Circulation - ROMS, Wave - WWIII & SWAN, Tide, Atmospheric – WRF & GRF) produce a comprehensive ocean state prediction for the main Hawaiian Islands. Recently, PacIOOS expanded our wave forecasting capability to Guam and the Northern Mariana Islands. Additional models have been commissioned.

Data Management and Communications
Central to the PacIOOS effort is the link between data (instruments) and information (integrated data products). The data management system provides five essential functions: data archive, metadata management, data discovery tools, data transport servers, and on-line browse capabilities.