

Progress Report
Developing the Pacific Islands Ocean Observing System (PacIOOS)
Cooperative Agreement # NA11NOS0120039
Performance Period: December 1, 2012 through May 31, 2013

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1.0 Project Summary

The Pacific Islands Ocean Observing System (PacIOOS) is the Regional Association (RA) for Hawaii and the Insular Pacific region being developed as part of the national Integrated Ocean Observing System (IOOS). The primary goal of the work proposed under this award is to continue the development of an operational ocean monitoring and forecasting system that provides integrated, customized, and timely products that enable an ocean-literate and well-informed public and policy makers in the Pacific Islands. PacIOOS is being planned and implemented through the collective efforts of a consortium of users, signatories to the Memorandum of Agreement, and 17-member Governing Council. PacIOOS has focused initial development on water quality sensing, ocean-state and forecasting, the provision of marine ecosystem information, prediction of coastal hazards, and the development of integrated data visualization capabilities to inform marine spatial planning, operations, commerce, and recreation. Through the efforts proposed under this award, PacIOOS will enhance development of observing and product suites in each of the aforementioned focus areas and will continue to engage users, stakeholders, and system partners in the use, extension, education, and outreach of technical capacity, data visualization, and ocean information.

This report covers activities conducted during the fourth 6-month performance period of a 5-year award. This report concludes Year 2 of the 5-year award. PacIOOS operated with a budget of \$2,488,545 for FY12.

2.0 Progress and Accomplishments

All ongoing operations proposed under our FY12 descope continue as planned.

2.1 User Needs, Stakeholder Input and Partnerships

- New Signatories to the MOA:
 - NOAA National Weather Service
 - PALARIS (Palau)
 - MERIP (Marine and Environmental Research Institute of Pohnpei)
 - Conservation Society of Pohnpei
 - Micronesia Conservation Trust

- Participation in the BOEM Task Force, NOAA Pacific Island Regional Team (PIRT), NOAA Sentinel Site Program, NOAA Pacific Regional Outreach Group (PROG) and State Office of Resource and Management Planning (ORMP) efforts. An example of our work with the NOAA Sentinel Site Program is the website we developed specifically for the Heeia site: <http://oos.soest.hawaii.edu/pacioos/projects/hawaiisentinel/index.php>

- Melissa Iwamoto, Heather Kerkering, and Simon Ellis hosted a capacity building workshop in both Marshall Islands (Majuro, College of the Marshall Islands) and in the Federated States of Micronesia (Pohnpei, Tuna Commission offices). Each of these workshops was designed to be interactive, and both were well-attended.
- PacIOOS initiated two collaborative projects with the Hawaiian Islands Humpback Whale National Marine Sanctuary. We are providing geospatial and data expertise, space, and assistance for the Niihau Management Project. Additionally, our modelers provided ocean circulation information for a West Maui discharge study.
- PacIOOS and the local Alliance for Coastal Technology program reignited a partnership to explore ocean acidification sensors and research.
- PacIOOS established a relationship with NCCOS as they are planning to complete a Hawaiian Island BioAssessment. PacIOOS contributions include all environmental, geological, and habitat layers on both Explorer and Voyager.
- UH Manoa School of Ocean and Earth Science and Technology (SOEST) Outreach and Education meeting
- Pacific Islands Regional Climate Assessment (PIRCA) Regional Meeting

2.2 Governance and Administrative Structure

- PacIOOS hosted Governing Council Executive Board Meeting in February to address potential consequences of sequestration.
- Co-PI meetings are held bi-monthly to engage and update.
- PALARIS (Palau) and NOAA NWS now have representation on the Governing Council.
- Heather Kerkering spent much of the last 6 months addressing and finalizing organizational structure and instrument data management flow with each of the PIs and their respective groups.
- Performance Evaluations completed for all PacIOOS staff.
- Working in collaboration with UH Sea Grant, two new liaisons were hired in the insular Pacific region: American Samoa and Majuro.
- PacIOOS began hosting our first summer intern in mid-May.

2.3 Business/Operations Plan

- PacIOOS released a 5-Year Strategic Operational Plan in January 2013. We continue to focus on implementing the goals and priorities of the Strategic Operational Plan.

2.4 Planning, Design and Implementation

- Expanded WWIII to the Samoan Islands and SWAN to Tutuila Island in American Samoa.
- Enhanced capacity to provide 7-day high water level forecasting
- Expanded the WRF atmospheric models to CNMI (12k resolution) and Guam (3km resolution).
- Planned: wave buoy deployment off Kauai and American Samoa.
- Planned: redeployment of wave buoys off Majuro and Ipan, Guam.
- Planned: HFR installation in Hilo Bay (x2) and Barbers Point (Chevron)
- Planned: water quality sensor deployment in Kahului and Kihei, Maui.

2.5 DMAC

- Major migration of all google-based products to Google Maps Version 3.
- Creation of new wave buoy pages.
- Synthesized and organized county water quality data to allow users to determine health and safety of beaches around the Hawaiian Islands.
- Updated data servers to access HYCOM rather than NCOM Global Ocean Forecast.
- Enhanced user interface and experiences on the web page.
- Continuously work with data and technical staff in each of the focus areas to improve user experiences and access to products and data.
- Purchase of additional server space and capabilities
- New additions to the PacIOOS Voyager, our data visualization tool, include:
 - AVISO Satellite Merged Altimetry
 - High Sea Level and Wave Run-Up Forecasts
 - Hawaii Beach Safety Sites
 - Global Ship Traffic
 - Nautical Chart Auto-Selection Utility
 - WRF atmospheric models in CNMI and Guam
 - Insular Pacific Shallow-Water Benthic Habitat layers
 - Insular Pacific Maritime Boundaries
 - Hawaii Beach Water Quality Monitoring
 - Aquarius Sea Surface Salinity Satellite Imagery
 - Spatial Distribution Layers: Coral Reefs, Tiger Sharks
 - Samoa Wave Models, both WW3 and SWAN
 - An overlay of nearshore and offshore safety conditions added to the 'Hazard' category, allowing users to better determine where it is safe to swim based on ocean conditions.
 - New and extended monthly satellite climatologies for: 1) AVHRR sea surface temperature; 2) MODIS Aqua chlorophyll-a; and 3) SeaWiFS chlorophyll-a.
 - Access to 1-minute NOAA/NOS/CO-OPS water level data, requested after the Queen Charlotte tsunami.
 - New Time Zone options for exploring data sets throughout the Pacific.
- A number of layers were added to the Explorer geospatial tool. Our staff are close to completing a catalog of all geospatial data available from agencies and partners around the entire Pacific. Additionally, we recently gathered new data from Majuro, Marshall Islands and from the Coastal Geology Group at UH.
- All of our DMAC staff continues to work toward meeting all of the IOOS goals and requirements, including SOS compliance.

2.6 Education, Outreach and Public Awareness

- Hosted a successful Coastal Hazards webinar introducing partners and the community to our new wave buoy page and data display options:
<http://oos.soest.hawaii.edu/pacioos/wavebuoy/index.php>
Over 70 people from a diversity of disciplines participated.

- In collaboration with COSEE, two PacIOOS flat panels are now operational at 1) University of Guam and 2) Maui Ocean Center.
- Participation/Exhibits/Presentations at The Nature Conservancy, NOAA PSC, Science Foundations for Ocean Planning in Hawaii, Hawaii Ocean Safety Team, Area Committee Meetings, Pacific Climate Forum.
- Continue to produce updated and relevant flyers and materials for workshops, conferences, Congressional visits, and partner meetings.

2.7 National and International Collaborations

- Chris Ostrander (lead PacIOOS PI) and Heather Kerkering participated in the Global Ocean Observing System conference held in Honolulu and established firmer relations with our international PI-GOOS partners.
- Heather Kerkering continues to participate in all IOOS and IOOS Association conference calls and workshops. Specifically, the Advocacy Team and Finance Committee. Both Chris Ostrander and Heather Kerkering remain members of the IOOS Association Board.
- Chris Ostrander continues to exercise his role in the IOOS Federal Advisory Committee.
- Chris Ostrander continues to serve on the Indo-Pacific Oceanography Reference Group (UNESCO-IOC)
- Melissa Iwamoto continues to participate in the monthly IOOS Association EOC conference calls.

3.0 SCOPE of WORK

3.1 User Needs, Stakeholder Input and Partnerships

- Continue to work with Pacific-based programs and the new NOAA Pacific Regional Team.
- Participate in upcoming CMSP and ROP conferences to promote a data services role for PacIOOS.
- Host webinars focused on specific user groups and management questions.
- Visit Insular Pacific Islands. Planned: Guam, Saipan, and Palau.
- Engage Guam and CNMI stakeholders at upcoming Guam Council Meeting.

3.2 Governance and Administrative

- Host Governing Council meeting in Guam.
- Participate in national IOOS activities that provide direction to the development of PacIOOS.
- Meet frequently with PacIOOS PIs and focus area groups.

3.3 Business/Operations Plan

- Complete a performance evaluation strategy in relation to our 5-yr Strategic Operational Plan and for future proposals and priority establishment.
- Continue to work with COL and IOOS Association to promote results from IOOS Summit.
- Identify funding opportunities with partners.

3.4 Implementation Activities

- Wave buoy planned for American Samoa in May 2013 (*US Navy failed deployment – plan to reevaluate once the buoy is returned in mid-August*).

- Wave buoy planned for north Kauai (*Midway deployment canceled due to USFW staff layoffs*).
- Wave buoy redeployment planned for Majuro, Marshall Islands and Ipan, Guam.
- New WQ sensors deployments in: Maui (2) (*close to finalizing permits*).
- Expansion of models in Spring 2013: ROMS to Guam, CNMI and American Samoa. WRF to Guam and CNMI.
- Increase number of tagged animals in and around Oahu.
- Participate in new Kilo Nalo underwater cabled observatory process.
- Expand OA capabilities by supporting a DIC sensor on our south shore wave buoys.

3.5 DMAC

- Release new water quality pages on PacIOOS website.
- Continued expansion and addition of data into Voyager and Explorer, specifically biological data.
- Development of new tools including ‘Forecast of the Potential for High Sea Level and Wave Run-Up’ at a number of locations throughout the Pacific.
- Phased conversion of WQ sensors in insular Pacific from telemetered to self-recording.
- Secure real-time data flow from Hawaii-based sensors, specifically water quality buoys on the Big Island. (*complete*)
- Improve and increase number of Harbor Surge Models.
- Continue meetings IOOS DMAC protocol, specifically demands for SOS compliance.
- Continue improvement upon navigation to and explanation of tools and services available on PacIOOS website.

3.6 Education, Outreach and Public Awareness

- Continue to program flat panels for additional locations identified and secure by COSEE.
- Continue to present and participate in local events (SOEST Open House, Hawaii Conservation Conference).
- Host additional Webinars.
- Continue to provide and create outreach materials.

3.7 National and International Collaborations

- IOOS Association meeting in November.
- Ocean Acidification Meeting in September.
- DMAC and possible Product Development workshop in September.
- Continued participation in IOOS Association, PI-GOOS, IOOS FAC.

4) Personnel and Organizational Structure

Ms. Heather Kerkering transitioned to the Director position on November 1, 2012 following approval of the PI, Director, and Governing Council. This report represents her first 7 months in the position.

5) Budget Analysis

Due to the five-month delay in the arrival of FY11 funds and, the subsequent carry-forward of a balance equivalent to five months of spending of the previous performance period, some of the PIs have not drawn down funds as much as would be expected by this point in time. A significant portion of the remaining award funds was awarded to PIs and spent on

instrumentation and equipment to meet the scope of work outlined in FY12 for expanding observations, data management, modeling, and product development goals. While some PI accounts have funds remaining, the majority of the program is on budget with little excess.

The University of Hawaii Office of Research Services submitted a financial report for this reporting period, through Grants Online, dated 3/31/13.

Semi-Annual Supplemental Information

1.0 Regional Ocean Governance Organization

The Regional Ocean Governance structure within the PacIOOS region is the Pacific Regional Ocean Partnership (PROP). The U.S. Pacific Islands Region Governors of American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), Guam, and Hawaii established PROP in August 2012. Appointed members of the PROP have met only twice, by phone, and are in a relatively elementary stage compared to other regional ocean governance structures around the nation.

We are in continued contact with the PROP Secretaries regarding possible contributions PacIOOS can make toward PROP initiatives and for identifying areas of collaboration. Additionally, 3 of our Governing Council members from the islands of Hawaii, Guam, and American Samoa, are heavily involved in PROP planning.

In addition to the PROP, there is a Regional Planning Body focused on CMSP. The RPB plans to meet in mid-July to discuss process and partners. PacIOOS will participate as a member of the public at the meeting. We've offered our data expertise and infrastructure but are waiting to see how the members of the RPB plan to move forward in the development of their data portal.

2.0 Efforts to leverage IOOS funding

- The wave buoy program in the Pacific is a collaborative effort made possible by funds from PacIOOS, the University of Hawaii (UH), and the Coastal Data Information Program (CDIP). The CDIP partnership alleviates our staff from managing the wave buoy data, saving both time and money.
- Partner programs purchased a number of the buoys we operate and maintain; for example, the Kona and Hilo water quality buoys (NSF-EPSCOR) and the Kaneohe buoys (Department of Energy). The assets help with NSF related projects on the Big Island and wave energy experiments in Oahu. We host the data and our users benefit.
- A number of our buoys broke free this year and we relied on partners in the insular Pacific to retrieve the buoys. In the two recent cases, both the College of Micronesia and the University of Guam retrieved the buoys without charge.
- The Maui Community College will operate and maintain the water quality sensors we plan to deploy in Maui. These services will be provided free of charge by the Marine Option Program, led by PacIOOS Council member Donna Brown.

- PacIOOS pays \$40K per glider expedition. The gliders we operate are part of a larger glider pool at UH, which is comprised of ten systems purchased by various programs. Data from each glider mission is available to all partners, meaning that PacIOOS has access to data from ~10 missions per year, while paying for only one.
- All HFR operations are a results of collaborative efforts between CIMES, PacIOOS, and UH. CIMES and UH provided much of the initial investment into the development of the HFR systems used in Hawaii. We fund operations and maintenance.
- Installment of HFR at any of our sites is a result of collaborations with property owners. Depending on the site, we use space, electrical, and internet access to operate the systems effectively. Example partners/sites include Kapiolani Community College, US Air Force, UH Medical facilities, and Chevron.
- The majority of data in our Voyager and Explorer tools are provided by partner agencies. This saves PacIOOS from needing to perform additional ocean survey and observational work to provide valuable information to stakeholders. Our partners help us meet our stakeholder needs.

3.0 Update to RA Governance board membership (required template included)

PacIOOS recently held elections to renew/replace 5 Governing Council members:

Dr. Kyle Vanderlugt, Liquid Robotics

Dr. Rusty Brainard, NOAA PIFSC

Mr. McGrew Rice, Western Pacific Regional Fisheries Management Council

Dr. Yimnang Golbuu, Palua International Coral Reef Center

Dr. Don Hess, University of the Marshall Islands

Results:

Dr. Kyle Vanderlugt, Mr. McGrew Rice, and Dr. Don Hess were all re-elected to the Governing Council.

Dr. Ed Young of the NOAA NWS replaced Dr. Rusty Brainard.

Madelsar Ngiraingas, Office of the PALARIS Ministry of Public Infrastructure, Industries and Commerce in Palau replaced Dr. Yimnang Golbuu.

The total number of MOA Signatories is 33.

The new signatories include:

NOAA National Weather Service

PALARIS (Palau)

MERIP (Marine and Environmental Research Institute of Pohnpei)

Conservation Society of Pohnpei

Micronesia Conservation Trust

4.0 Governance Activities and Accomplishments

- The Governing Council Executive Board met in February 2013 to prepare responses to an uncertain FY13 federal budget and the various scenarios provided by the IOOS Office.
- Each of the MOA Signatories participated in a successful election cycle to replace or re-elect 5 Council members.

- PacIOOS gained 5 new MOA Signatories.

5.0 Education and Outreach Activities

PacIOOS held or participated in a number of outreach activities (presentations, live demos, and webinars). Many can be found here:

<http://oos.soest.hawaii.edu/pacioos/outreach/events/index.php>

For example:

- Coastal Hazards Webinar was held Wednesday, February 13th. Three PacIOOS PIs participated in the webinar by explaining and fielding questions regarding the wave information and data available on the PacIOOS website and Voyager to an audience of approximately 100 people. This included the introduction of our new Wave Buoy Page on the website: <http://oos.soest.hawaii.edu/pacioos/wavebuoy/index.php>
- Pacific Climate Forum
- Seminar Series at UH Manoa
- Seminar Series at Hawaii Institute of Marine Biology
- The Nature Conservancy
- Pacific Services Center
- Blue Revolution
- Waimanalo Community, Oahu
- Hawaii Ocean Resources Management Plan Working Group
- Hawaii Marine and Coastal Zone Advocacy Council (MACZAC)
- NOAA FAD Workshop
- EBM Fisheries Meeting
- PRiMO – Pacific Risk Management Ohana
- Molokai Earth Day
- Meetings in Majuro, RMI Stakeholders (flyers)
- Meetings in Pohnpei, FSM Stakeholders (flyers)
- Waikiki Aquarium Staff
- Mauka to Makai Earth Day event at Waikiki Aquarium
- MATE ROV Competition on Oahu
- Friends of Kewalo Basin, Oahu
- GOOS meeting in Waikiki, Oahu

IOOS defines

Outreach: Engagement with individuals and organizations with the primary purpose of service as a resource to those individuals or organizations.

Education: Providing products or sustained services including formal classroom learning, curriculum development, professional development of teachers, and information learning resources.

In this reporting period, PacIOOS focused on outreach activities. While PacIOOS did not produce materials for classroom learning, curriculum, or professional development of teachers, we frequently participate in informal education events such as Earth Day with the Waikiki Aquarium.

5.1 Update information contained in the Education and Outreach Tool

- Completed. Please see google shared Inventory for responses.