

PROGRESS REPORT

Project: **The Alliance for Coastal Technologies (ACT): National-Scale Efforts Toward Verification and Validation of Observing Technologies**

Grant No. **NA11NOS0120037**

Reporting Period: **06/01/16 - 11/30/16**

1) Project Summary:

The Alliance for Coastal Technologies (ACT, www.act-us.info) is a collaborative partnership of academic institutions, state and federal resource managers, and private sector companies dedicated to fostering the development and adoption of effective and reliable sensors and sensor platforms for environmental monitoring and long-term stewardship of coastal and ocean resources. ACT seeks to achieve progress towards our goals to: (a) rapidly and effectively transition emerging technologies to operational use; (b) maintain a dialogue among technology users, developers, and providers; (c) identify technology needs and novel tools and approaches to meet those needs; (d) document technology performance and potential; and (e) provide U.S. IOOS with information required for the deployment of reliable and cost-effective networks. ACT pursues these goals through a three-pronged strategy of: (a) verification and validation of sensors and platforms for coastal and ocean observing systems through Technology Evaluations in different environments, utilizing both field experiments and laboratories to recreate environmental conditions; (b) capacity-building through Technology Workshops that involve researchers, manufacturers, users, regulators, and facilitators; and (c) knowledge exchange through an Information Clearinghouse and Technology Database that connects users with technology suppliers worldwide, presenting a forum to explore instrumentation options, and ultimately to share knowledge and experience, and exchange best practices. A unifying principle among these core activities is collaboration between technology/knowledge producers and users to provide input to ACT at every step of each process—from documenting national and regional needs, selecting sensor classes for evaluation and topics for workshops based on established regional priorities, to end-user application of new information.

2) Scope of Work:

ACT's proposed Year 5 Work Plan includes tasks for sustaining core technical functions and efforts addressing instrumentation needs to monitor and understand ocean acidification and hypoxia in coastal waters.

- A. *Complete DO Sensors II Verification and Release Reports.* ACT will conclude the field tests of the in situ DO sensor verification by the end of 2015. ACT will work with the DO Technical Advisory Committee to review, verify, and validate all data collected during the laboratory and three field tests, including both data from the test instruments and data generated from the reference method. This ensures that the test data meet quality assurance requirements, are accurately presented in the verification reports, and that data not meeting these requirements are appropriately flagged and discussed in the reports. A final evaluation report will be prepared for each verified technology and reviewed by the respective participating vendor, ACT PIs, and the DO Technical Advisory Committee. Final reports to be released by spring 2016.
- B. *Continue the Nutrient Sensor Challenge.* ACT will continue collaborations with OSTP, NOAA, IOOS, EPA, USGS, USDA and NIST to manage and execute the Nutrient Sensor Challenge with specific tasks focused on the following:

Organize and host the Challenge Summit in the Washington, D.C., area in August 2015. The purpose of the Challenge Summit is to provide learning and networking opportunities for participants. Activities at the summit will include strategies for: (a) fundraising and sponsorship, (b) guidance on instrument certification and approval processes, and (c) opportunities for networking and team-building among

participants. Participants not engaging directly in beta testing are also encouraged to attend.

Conduct “no-risk” beta testing of prototype next-generation nutrient sensors entered in the Challenge. Beta testing is intended to provide participants with reference sample results against which they can compare their sensor’s performance. ACT will not compare sensor results to reference samples or publicize any participant’s performance. Beta testing will be available at three sites from August through October 2015 and will include a freshwater stream or river, a brackish estuary, and a coastal ocean environment. Beta testing will be available within a two-week window at each site. During beta testing, discrete reference water samples will be collected by ACT at least twice daily Monday-Friday. Following beta testing at each site, participants will be provided with the ACT laboratory analysis results of the discrete water samples, against which they can compare their own individual sensor’s performance.

During the fall of 2015, ACT will work with the Technical Advisory Committee (TAC) to develop draft protocols for verification testing of submitted nutrient sensors. These protocols will be designed to quantitatively and statistically assess instrument characteristics and performance against the Challenge criteria (available at www.nutrients-challenge.org). The draft protocol will be circulated to both the Challenge TAC and Challenge participants for review and comment. A two-day workshop will then be held in January 2016 (with participating developers, the TAC, and the ACT testing team) to build consensus on the final testing protocols and associated methods.

Finally, ACT will continue to: (a) assist in Nutrient Sensor Challenge planning and management, (b) host and update the Challenge website (www.nutrients-challenge.org), and (c) support broad community and stakeholder engagement and outreach.

- C. *Technology Workshop and Vendor Demonstration of ASVs.* ACT will continue our collaborations with the CO-OPS Center Ocean Systems Test and Evaluation Program (OSTEP), the Coast Survey’s Hydrographic Systems and Technology Programs (HSTP) and R/V *Bay Hydro II* on holding this joint workshop and informal demonstration activity on autonomous surface vehicle (ASV) technologies for use in shallow water mapping and water quality monitoring. A one and a half-day workshop at CBL in Solomons, MD, with ASV developers, manufacturers, and users will be held to discuss the current state of the technology and future directions and applications. This will be followed by a one-day vendor demonstration of their individual platforms on the Patuxent River, a major tributary of the Chesapeake Bay. This will not be a formal ACT Technology Demonstration (no direct assessments of ASV performance will be conducted), but developers and vendors of these mobile instrument platforms will have the opportunity to demonstrate capabilities and features to a wide audience of potential users under real-world conditions.
- D. *Outreach and Community Involvement.* We plan to continue some fundamental outreach activities, including participation in national conferences, symposia or related workshops. We will also work with the IOOS Association and the RAs to solicit RA input on priorities for ACT Technology themes and to promote ACT and RA collaborations. Finally, we will continue communications with, or support of, NDBC, CO-OPS, USACE, NWQMC, and QARTOD, and will continue joint activities with other related agencies including NIST, MARAD, USCG and EPA.
- E. *Technology Information Clearinghouse.* ACT will continue maintenance of its website and the Technology Database. We will regularly update content of the website, including posting new Technology Evaluation and Workshop final reports (as download PDF files), related news items and web links, and basic ACT program information. The searchable Technology Database will also be maintained and expanded, where possible. We will also continue our collaboration with the NWQMC National Environmental Methods Index (NEMI, www.nemi.gov) on the integrated Methods of Environmental Measurement and Observation (MEMO). The MEMO web portal allows for searches of specific environmental parameters that result in listings and documentation on both standard methods and commercial instruments to quantify/measure the parameter of interest.

F. *Program Administration.* ACT will maintain routine governance responsibilities and management functions and schedules. Dr. Tamburri (CBL) will continue to coordinate core functions and guide program-wide activities, such as partnerships with other agencies and linkages with the coastal management community, with support from the other funded PIs. Monthly PI conference calls and one annual organizational meeting will continue.

3) Progress and Accomplishments

The following table provides a comparison of actual versus proposed accomplishments with the goals and objectives for the period, and reasons why objectives/goals were not met (if needed).

Technology Related Tasks		
Activity	Purpose	Status
Complete DO Sensors II Verification and Release Reports	Complete the verification testing of commercially available DO sensors at four ACT test sites and draft final reports for each instrument. Provide independent third-party test results on instrument performance to help vendors identify limitations and diverse user groups select the instruments that best meet their needs.	<u>Completed.</u> All lab and field tests of DO sensors have been completed as planned. Data analysis and plotting has been completed. Individual sensor reports were reviewed by the Technical Advisory Committee and participating manufacturers. Final reports were released on the ACT website.
Continue the Nutrient Sensor Challenge	Facilitate the development of next-generation in situ nutrient sensors. Provide independent third-party test results on instrument performance to help vendors identify limitations and diverse user groups select the instruments that best meet their needs.	<u>Ongoing/On Schedule.</u> All lab and field tests of nutrient sensors have been completed as planned. Data analysis and plotting is now underway and draft reports will be sent to the Technical Advisory Committee and participating manufacturers in January 2017. ACT continues to coordinate with multiple agencies to manage and publicize the Challenge. Challenge winners will be announced at the ASLO 2017 Aquatic Sciences Meeting, Mountains to the Sea, in Hawaii on March 2, 2017.
Technology Workshop and Vendor Demonstration of ASVs	Partner with CO-OPS OSTEP, OCS HSTP and R/V <i>Bay Hydro II</i> on workshop and informal demonstration of ASV technologies for use in shallow water mapping and water quality monitoring. Link technologies with user needs and build consensus and capacity.	<u>Completed.</u> A one and a half-day workshop at CBL in Solomons, MD, was held, followed by a one-day vendor demonstration of their individual platforms on the Patuxent River, on November 18 - 20. A very productive exercise for both technology developers and users (particularly groups within NOAA NOS). The workshop report was released on ACT website in May 2016.

Technology Information Clearinghouse		
Activity	Purpose	Status
Manage, maintain, and update interactive on-line database.	Provide ocean technology community a single resource for identifying available technology options; facilitate coastal observing technology providers and users to match needs in a virtual “marketplace” environment.	<u>Ongoing/On Schedule.</u> ACT website will soon include 65 Technology Evaluation reports, 42 Technology Workshop reports, and over 4,000 instrument listings (from over 300 international companies) in the searchable Technology Database. All ACT reports, including Test Protocols, Technology Evaluations, Workshops, and Needs and Use Assessments, will continue to be searchable and available as download pdf files through the website.

Outreach and Community Involvement		
Activity	Purpose	Status
QARTOD Board of Advisors conference calls.	Support related efforts. Build awareness, identify community needs and develop collaborations.	<u>Ongoing.</u> Every other month
Participated in NWQMC Sensor Working Group call, ACT Director an active member of this committee for several years.	Build awareness, identify community needs and develop collaborations.	<u>Ongoing,</u> periodic Working Group calls
Challenging Nutrients Coalitions meetings and planning.	Build awareness, identify community needs and develop collaborations.	<u>Ongoing,</u> periodic calls
Maritime Alliance National Advisory Committee, ACT Director was invited to be a member of this committee.	Support related efforts. Build awareness, identify community needs and develop collaborations.	<u>Ongoing,</u> periodic calls
Pisces/Intel Water Monitoring Steering Committee, ACT Director was invited to be a member of this committee.	Build awareness, identify community needs and develop collaborations.	<u>Ongoing,</u> periodic calls
Meeting with EPA and USGS on third-party sensor testing.	Progress on compliance monitoring sensor testing and plan for future activities. Build awareness, identify community needs and develop collaborations.	<u>Completed.</u> July 6, 2016

Program Administration		
Activity	Purpose	Status
ACT Partner conference calls	Coordination, progress reports, and planning.	<u>Ongoing,</u> first Thursday of each month.

4) Budget Analysis

Actual expenditures have been incurred in accordance with the spending plan provided in the UMCES application. While some very minor changes to the original scope of work have been made, funds designated for categories such as subcontracts, salary/benefits, supplies, and travel have not been altered. It is not anticipated that any budget modifications will be needed during the next reporting period. All financial reports for this award are up to date.