

IOOS: A vision for the next ten years



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IOOS Summit 2012
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"In the United States, critical decisions affecting our lives, livelihoods and quality of life depend on successful communication and understanding of accurate and reliable scientific information about our oceans, coasts and Great Lakes. The U.S. Integrated Ocean Observing System (IOOS®) is a coordinated national, international, regional and local network of observations, modeling, data management and communications that provides the knowledge needed by society to protect life and property, to sustain a growing economic vitality, to safeguard ecosystems, and to advance quality of life for all people. Building upon progress over the past several decades, we must continue to expand, improve, and sustain the system to address the growing societal needs for ocean observations and information."

This quote is the opening text of the *Integrated Ocean Observing System (IOOS) Summit 2012 Declaration* signed by 144 Summit participants and 32 additional supporters. The U.S. Interagency Ocean Observing Committee (IOOC) convened an IOOS Summit on November 13-16, 2012, ten years after an initial workshop defining IOOS requirements. The participants at the Summit reviewed progress in the design and implementation of IOOS, a national endeavor that has been endorsed by federal and state agencies, tribes, academia, industry and NGOs. Summit participants identified notable successes in developing a functioning system, as well as technical and practical challenges and opportunities that IOOS will face in the coming decade. Previous editions of *Sidelights* have chronicled IOOS, a federal-regional partnership of federal agencies and IOOS Regional Associations, and highlighted information and products from one of the IOOS Regional Associations, NANOOS. In this edition, we provide content from the IOOS Summit Declaration defining the need, accomplishments, and vision for IOOS in the next ten years. Future editions will feature articles by other Regional

Associations around the country.

Understanding of the need for IOOS

The past ten years have seen substantial progress in designing and implementing U.S. IOOS. We are delivering real value to the American public and foresee even greater contributions in the coming decades. Recent events underscore the importance of IOOS to the economic, security and environmental interests of the United States.

Ocean, coastal and Great Lakes observations have proven to be essential for responding to weather, ocean, and human-mediated disasters on global, regional and local scales; as well as in reducing and mitigating the economic, social, and cultural risks of extreme events.

The increasingly clear understanding of the scope and impacts of environmental changes, including sea level rise, the increase in ocean acidity, and the need to respond, adapt to and manage those changes, calls for a more extensive and sustained monitoring of the oceans and coasts as critical to understanding and predicting the earth's climate systems.

Challenges of maintaining the quality

and quantity of food and water for the U.S. population and a rapidly growing global population will require improvements in our ability to predict ocean state conditions, weather, climate and extreme events including drought, harmful algal blooms and other conditions.

Economic development and job growth in areas experiencing dynamic change, such as the energy sector and maritime transportation, accentuate the need for the public and private sectors in the United States to understand ocean and coastal conditions as they relate to a transforming global economy, and to ensure safe and efficient operations.

A new dynamic of national and homeland security emphasizes that we must enhance our ability to monitor the oceans.

The increasing need for sustained marine ecosystem goods and services requires a robust infrastructure for biological, biogeochemical and ecological observations.

Ocean, coastal and Great Lakes observing leads to the creation of new high quality jobs to provide information supporting improved decision making in industries that depend on the oceans.

Now, more than ever, the United States

requires a sustained and integrated ocean observing system.

Accomplishments

IOOS has become well-established, supporting real-time decision making, providing critical products and information for weather, climate and ocean applications. Regional implementation is established covering all coastlines and constituencies. Global implementation now covers all areas of the ice-free oceans, providing leveraged international support to coastal IOOS.

Federal law strongly supports IOOS and provides a governance framework for a federal/regional partnership with a unified policy and operational success.

Investments in observations and data assimilating models have developed essential data and more reliable techniques and methodologies for monitoring and predicting conditions above and below the water's surface.

Data have been made interoperable between diverse systems, and standards have been established so that data can now flow between federal and non-federal partners.

A broad set of different ocean observing and stakeholder communities, public and private, have been engaged in developing IOOS and the need for an ocean observing system.

Moving forward – the next ten years

A system for ocean observing has been established over the past several decades. IOOS will continue to evolve by revising, enhancing and integrating current and planned observations systems in order to meet user requirements, emerging challenges, and to achieve societal goals. The opportunity is set for moving forward for the next ten years.

Observing Capability: All IOOS components currently under-observe their target phenomena. IOOS will seek to encompass deep-ocean observations, nearshore and estuarine observations, biological and chemical variables, ecosystem variables; to better integrate

remote sensing; and to meet spatial (including sub-surface) and temporal requirements for ocean data, addressing user needs. This will build on the successes of the coordinated global ocean, terrestrial, atmospheric observing systems.

Technology And Workforce: IOOS will promote leading edge technology development capabilities. IOOS will incorporate emerging technologies as a standard operating procedure, in particular leveraging the development of the Ocean Observatories Initiative. IOOS will foster the development of a workforce for the future, adept at developing, using and furthering these technologies.

Modeling and Predictive Capability: Models and observations will work together to provide the information needed by user communities. Improved and more sophisticated models will better exploit IOOS observations, leading to more precise and accurate predictions to aid in making economic, environmental and societal decisions.

Information Products: IOOS plays a foundational role by providing reliable access to quality-controlled data and information products that support critical decision making for multiple uses. The system preserves the value of the information now and for future generations. This information plays a critical role in ocean literacy and education at all levels.

Partnerships: IOOS will continue to succeed as a collaborative effort among federal and state government agencies, tribes, regional partnerships, the academic community, and the private commercial and environmental communities. The U.S. collaborative will help to sustain global efforts, as well as derive understanding and context from parallel efforts around the globe.

User Communities: As the demand for economic growth and stability in sectors influenced by marine resources grows, it becomes more imperative to support an increasingly diverse user community.

Resources: Federal support has been

and will continue to be critical to the success of IOOS.

New approaches to product development and distribution need to consider a broadening of funding support, additional funding sources, and innovative public-private partnerships. ☆

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White papers submitted by the U.S. IOOS Community are available at: <http://www.iooc.us/summit/cwps/>. Over a hundred submissions were received covering a wide-range of ocean observing topics. The IOOC website lists the papers which are sortable by either titles or authors and the titles contain a link to the paper uploaded in Google Docs.

