

NOAA IOOS® in Action: Data Integration

Laying the Groundwork with Standards and Protocols

Overview:

Marine data are continuously collected with thousands of tools in the water, on land, in the air, and from space. An Integrated Ocean Observing System (IOOS) is needed to make all these data compatible and easily accessible, without further translation. That will save users time and money and improve things like severe weather forecasts, natural hazard predictions, and oil spill and pollution tracking.

The NOAA IOOS Data Integration Framework is laying the foundation for this effort by adopting standards for such things as the recordation of varied units of measure, data formats, and how users search and retrieve data.

The program's initial focus is on integrating a set of seven observations: temperature, salinity, water level, currents, ocean color, winds, and waves. The goal is to prove the value of these integrated data in four areas: flood/sea level rise predictions, harmful algal bloom forecasts, integrated ecosystem assessments, and hurricane intensity forecasts.



Raw data from various sources become useful information with Data Management & Communications, the means through which data are made compatible and easily accessible. The NOAA IOOS Data Integration Framework is spearheading this effort by adopting and adapting standards for such things as the recordation of varied units of measure, data formats, and how users search and retrieve data.

Making The Concept a Reality:

Integrated ocean and coastal data are now available through IOOS. In September of 2008, the NOAA IOOS Program completed the first major milestone in its data integration effort, in collaboration with two NOAA partners and one IOOS region.

The National Data Buoy Center, the Center for Operational Oceanographic Products and Services, and the Southeast Coastal Ocean Observing Regional

Association are now using the same web services to deliver integrated currents, water level temperature, salinity, winds, and waves data. NOAA's CoastWatch program is also delivering integrated ocean color data.

This integration effort is the first IOOS step in providing decision makers with simplified access to information which will improve public safety, enhance the economy, and protect the environment.

Applying Integrated Data:

The first integrated data available through NOAA IOOS are now in use through a Google map resource in NOAA's Harmful Algal Bloom Forecasting System.

The National Data Buoy Center and the Center for Operational Oceanographic Products and Services recently began providing currents data based on standards and protocols established by NOAA IOOS. The addition of currents data means there is now more information available for harmful algal bloom forecasters to use to predict the movement and spatial extent of local blooms.

By providing reliable delivery of data in the formats and time scales required by forecasters, IOOS is expected to reduce the manpower required to compile and convert the many different types and sources of data to common formats, quicken the time it takes to develop models, improve forecast accuracy, and reduce the cost to develop these forecasts.

NOAA's Harmful Algal Bloom Forecasting System is a partnership among the National Ocean Service, the Center for Operational Oceanographic Products and Services, the National Center for Coastal Ocean Science, and the National Environmental Satellite, Data, and Information Service.

Advancing National Standards: NOAA is providing new tools and resources to bring fresh momentum to the national standards process.

This is important because models and environmental analyses are often based on calculations that require consistent data inputs to

Harmful Algal Blooms kill marine mammals, make some shellfish unsafe to eat, and can cause breathing problems for people nearby.



The left image shows a harmful algal bloom approaching a coastal community. The deep color some blooms produce is the reason they are also referred to as "red tides".

produce meaningful results. One simple example is that a numerical temperature of 32 degrees in two different data sets has a different meaning if reported in Celsius or Fahrenheit. Similarly, geographic position may be expressed in degrees, minutes, and seconds of latitude or decimal degrees. A model cannot readily use data reported in differing formats. Such incompatibilities must be addressed through manual or automated data conversions - a costly and inefficient process.

NOAA IOOS developed a set of web-based tools and resources to simplify submission, review, and approval of proposed data standards on an interagency level. Participants from 17 federal agencies, as well as state, local, academic, and non-governmental partners, can now access tools and submit proposed standards online. This resulted in 12 new standards in review by the end of fiscal year 2008. In addition, there is now an effective process to move proposed standards through review.

Maximizing Expertise:

NOAA IOOS formed a cross-NOAA team of 27 senior scientists and technical managers to provide advice and guidance on planning and execution of program priorities.

This "Integrated Products Team" meets monthly, convenes workshops, and sponsors working groups to define specific technical plans and execute key tasks.

Working groups typically include additional technical members from NOAA and from IOOS Regions.

These partnerships are critical to the success of IOOS, as it would not be possible to design a feasible, integrated solution without the active involvement and input of multiple data providers.

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