Welcome, Chá bă!

On 12 July 2010, a surprisingly cool and rainy "summer" day in Seattle, a celebratory gathering assembled to announce the imminent launch of the newest instrument array to join the NANOOS family of assets. Joining Jan Newton, NANOOS Executive Director, was U.S. Congressman Norm Dicks, National Oceanic and Atmospheric Administration (NOAA) U.S. Integrated Ocean Observing System (IOOS®) Deputy Director Suzanne Skelley, Quileute Tribal Chair Anna Rose Counsell-Geyer, University of Washington (UW) College of the Environment Dean Lisa Graumlich, scientists from UW and NOAA, and local news media to discuss the scientific and public significance of this observing array. Four days later in La Push, the buoy and glider were deployed off the coast in the waters of the Olympic Coast National Marine Sanctuary (OCNMS) and Newton attended the OCNMS Advisory Council Meeting to introduce the observing capabilities to local representatives from tribal, state, and other entities.

Eric Boget, Nick Michel-Hart, Matthew Alford, and John Mickett deploy Chá bă for a test run in Puget Sound during the summer.

The array, primarily funded by the M.J. Murdock Charitable Trust with matching funds from UW, has three components: a moored buoy, Chá bă (pronounced "chay-buh," means "whale tail"), named by the La Push Quileute Tribe; a moored subsurface profiling buoy; and a UW-built Seaglider. The suite of instruments attached to these platforms provide data about coastal weather and ocean conditions, including the physical (temperature, salinity), chemical (dissolved oxygen, nutrients, pH, and CO_2), and biological (chlorophyll) characteristics of the water.

The location of the array was deliberately selected by project scientists to monitor "semi-normal, non-complicated waters off the shelf," says APL-UW scientist Matthew Alford, a lead researcher on the project. He notes "Our goal is to build a time series, so we can answer, 'What are the big signals?' " Newton, also a lead scientist on the project, adds that the location of this buoy will also allow scientists to better understand the coastal water that typically makes its way into the Strait of Juan de Fuca, Puget Sound, and Georgia Strait. This buoy site also complements seasonal NOAA buoys located in the shallower nearshore waters of the OCNMS.

The instruments that are part of this array will provide necessary and valuable data to many different user groups. Those who will benefit from the data collected by these instruments include: regional tribes and state resource managers to assess water properties and enable better understanding of hypoxia, ocean acidification, and Harmful Algal Blooms (HABs); weather forecasters who lack offshore wind observations; and the boating, fishing, and maritime communities who will be able to utilize the wave and wind data.

Initial assessment of the data from its recent test deployment of the buoy and glider (July–October 2010) is already intriguing. Alford saw "a vigorous internal wave field in the data. I am interested in internal waves and mixing, important for many reasons including how these influence transport of larvae on to the shelf." The Seaglider also gave returns from its acoustic receiver specially outfitted by the

Pacific Ocean Shelf Tracking (POST) project. The feasibility test of using gliders to extend the scope of acoustic tracking arrays into deeper waters and as a rapid deployment technology worked flawlessly—a salmon and Humboldt squid were detected.

Of importance to Newton is understanding the conditions that lead to coastal water with lower than normal pH or oxygen and the impact of these abnormal waters on Puget Sound. Newton has been collaborating with scientists from NOAA (Richard Feely, Chris Sabine, Simone Alin) and UW (Allan Devol) to assess ocean acidification in Washington. This information may help Puget Sound shellfish growers determine future optimal times to plant young oysters and clams, avoiding low pH waters.

The observing array is a good example of the leveraging possible within IOOS. The majority of the support for equipment came from a $500,000 M.J. Murdock Charitable Trust grant, with matching funds ($200,000) from APL-UW, the UW Provost's office, and the former UW College of Ocean and Fishery Sciences. NANOOS funds provided by NOAA are used to support scientists and technicians who maintain and operate the system. The non-profit organization POST outfitted the Seaglider with their acoustic receiver. NOAA-PMEL scientists provided assistance with the pCO_2 and pH sensors.

The project team anticipates that the Chá bă buoy, the subsurface mooring, and the glider will be permanently deployed in Spring 2011. Alford says that there is still room on the mooring lines for more instruments and that "researchers have already submitted proposals to add sensors for whale detections." After deployment, data from the array will be available online on the NANOOS Visualization System (NVS) (**www.nanoos.org/nvs/nvs.php**), along with readings from dozens of other sensors and instruments in the NANOOS network.

New Capabilities Field/Lab

Comparator

One of the newest utilities in NVS 2.0 is the Comparator tool that allows a user to compare observed data with model outputs. NVS 1.0 provided past (up to thirty days) and present observation data from NANOOS assets, and NVS 1.5 provided the capability to a limited number of assets to look into the future for select data variables using model forecasts. "Once users had access to both observations and forecasts," said Troy Tanner (APL-UW), a lead NVS developer, "they could view a wider range of plots, from 30 days prior to days or weeks in the future, but they had no way of viewing the entire time range together."
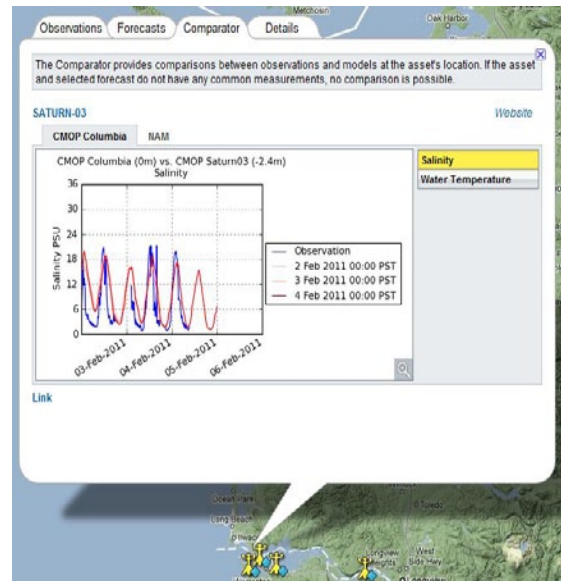
User comments sparked the creation of the Comparator by Tanner and Nicholas Lederer (APL-UW). Since this tool displays observations and forecasts in the same plot, only assets that have the same observation and forecast variable have the Comparator. "It also gives the casual user a way to see which forecast has a better track record when more than one forecast is available for an asset," says Tanner. Though not intended to replace model analysis, the Comparator provides researchers with a quick view of how the model is working and a first-glance assessment of the model's performance over several runs.

Products/Tools

There's an App for That!

For those of you wanting NANOOS data in the palm of your hand, we recently released NVS apps for Apple and Android mobile products. "The Data (DMAC) and Products (UPC) committees at NANOOS decided that having access to NVS while away from a computer would provide a great service to our users," says Rick Blair (Boeing), the lead developer of the apps. "The app was, therefore, developed to be as close to NVS as possible in both function and look and feel." Keep a lookout for new features in the future, including the inclusion of some currently web-only functions, alerts, and SMS messaging. You can download the free apps through iTunes or the Android Marketplace.

Improvements to NVS

The Data/Information Management and Communication (DMAC) and User Product Committees (UPC) have continued with their impressive efforts to enhance the NANOOS Visualization System (NVS). NVS version 2.0 was released this past summer with a new user interface and several new data tools.

Troy Tanner, a lead developer in DMAC, outlined additions and changes for this version:

User Interface additions:

- Feature dock: Menu bar provides easy view/hide control over a number of feature columns including: Filters, Assets, Overlays, Regions and Legend.
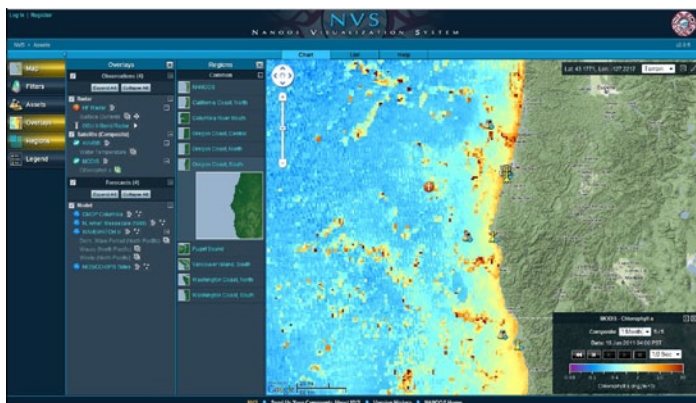
- Overlay legend: The legend, located in the lower right corner, provides information and controls for the overlay. If a time series, you can step through or play the series.
- Regions column: Provides quick shortcuts for zooming the map.
- Map redesign: Map size was maximized by removing padding and allowing the dock to be hidden, allowing the map to use virtually the entire screen.

Other additions and changes:

- Comparator tab: Allows comparisons between an asset's observations and available forecasts (*see page 2*).
- Details and Credit tabs: Provide more details about the asset.
- Data download formats: Data download formats now include CSV for Excel, JSON, or XML.
- Overlay download: Overlays can be downloaded in KML format and directly imported into Google Earth.

For a detailed list of additions and changes, you can view NVS Version History: **http://www.nanoos. org/nvs/information/version_history.php**

NVS Development Team: Troy Tanner, David Jones, Nicholas Lederer, Emilio Mayorga, (APL-UW); Jonathan Allen (DOGAMI); Craig Risien (OSU); Rick Blair, Stephen Uczekaj (The Boeing Company); Alex Jaramillo, Charles Seaton (CMOP)

Member Spotlight

Oregon Department of State Lands

The Oregon Department of State Lands (ODSL) is the parent organization of the South Slough National Estuary Research Reserve (NERR), which was the first designated Reserve in the NERR system in 1974. Dr. Steve Rumrill, a NANOOS Principal Investigator and Chief Scientist and Research Program Coordinator for the ODSL / South Slough NERR, and other NERR staff operate several water monitoring stations in the Slough to provide an understanding of the water conditions along the ocean-to-river gradient in the estuary. They also actively work with the local commercial oyster growers by providing essential data related to growing conditions of oysters through the NANOOS/NERR product Water Quality for Shellfish Growers. South Slough data can also be accessed through the NANOOS NVS. For more information, visit: **http://www.oregon.gov/DSL/SSNERR/**.

Happenings

MTS/IEEE Oceans 2010 Conference

David Martin (APL-UW and NANOOS Board Chair) co-chaired the Technical Committee for the Marine Technology Society(MTS)/Institute of Electrical and Electronic Engineers (IEEE) Oceans 2010 Conference held 20–23 September in Seattle, WA. The conference included two IOOS sessions chaired separately by Martin and Newton. Newton presented *NANOOS Contributions to Understanding Ocean Acidification* with co-authors from UW, NOAA PMEL and OSU; Emilio Mayorga (APL-UW and NANOOS DMAC) presented on *NANOOS Data Management and Visualization*. Additionally, Martin was the Chair for an IOOS Town Hall on IOOS RA certification.

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California and the World Ocean Conference

The theme for the 2010 CWO conference, held 7–10 September in San Francisco, was *Our Changing Ocean: a Vision for the 21st Century*. NANOOS partnered with its sister regional associations in California, CeNCOOS and SCCOOS, and IOOS on an exhibit booth that featured a Scripps-developed **M**obile **IN**teractive **I**maging **M**ultidisplay **E**nvironment (**MiniMe**). IOOS Director, Zdenka Willis, and NANOOS Executive Director, Jan Newton, also presented during the concurrent sessions.

Jan Newton [NANOOS Executive Director (ED)], Steve Ramp (CeNCOOS ED), Zdenka Willis (IOOS Director), and Julie Thomas (SCCOOS ED) at the CWO