NOAA Names Gerd Glang Nation's Hydrographer, Director of Coast Survey

submitted by
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Following his promotion on August 14 from captain to rear admiral, Gerd Glang was named as director of the NOAA Office of Coast Survey and the nation's chief hydrographer, responsible for mapping and charting of all United States coastal waters. On August 2, the U.S. Senate confirmed his nomination by President Obama to the rank of rear admiral (lower half), now a prerequisite for the position.

Rear Adm. Glang will be responsible for overseeing NOAA's hydrographic services, vital to the nation's $1.9 trillion maritime economy and supporting President Obama's National Export Initiative. Coast Survey is responsible for surveying and charting America's coastal and territorial waters as well as the Great Lakes, and provides hydrographic data, nautical products, research, and navigational services.

"NOAA's navigational services provide critical support to our nation's maritime economy and position it for future growth," said David Kennedy, NOAA assistant administrator for the National Ocean Service. *"As NOAA faces demands for the acquisition and use of hydrographic data for—and beyond—the maritime transportation system, Gerd Glang is the right person, in the right place."*

Rear Adm. Glang succeeds Capt. John E. Lowell, who retired in June after a 29-year career in the NOAA Corps, serving the last three years as director of NOAA's Office of Coast Survey and U.S. national hydrographer.

A NOAA Corps officer since 1989, RDML Glang is a professional mariner, specializing in hydrographic surveying and seafloor mapping sciences. RDML Glang served aboard four NOAA ships. On NOAA Ship *Rainier*, his first experiences in hydrography took him to the largely uncharted coastal waters of Alaska's southwest peninsula. He also served as the executive officer of NOAA Ship *Heck*. RDML Glang was commanding officer of NOAA Ship *Whiting* in 1999, when the ship responded to the seafloor search for John F. Kennedy, Jr.'s, downed aircraft. Just three months later, he led the *Whiting* to the first discovery of the seafloor debris fields from Egypt Air Flight 990. From 2008 to 2009, RDML Glang served as commanding officer of NOAA's largest ship, *Ronald H. Brown*, with oceanographic and atmospheric research operations from the South Pacific to the Atlantic Coast. ☆

NOAA Ship *Fairweather's* Arctic Reconnaissance Survey

NOAA Ship *Fairweather* conducted a 30-day survey mission in the Arctic during August. The reconnaissance hydrographic survey checked sparse soundings acquired by early U.S. Coast and Geodetic Survey field parties and data gathered by other agencies along a 1,500 nautical mile coastal corridor. As of the time of this writing, the cruise was planned for a track line from Dutch Harbor, Alaska, to the Canadian border. (Ice pack will ultimately determine if the ship makes it past Barrow.)

"Expected increases of Arctic maritime traffic, putting greater demands on the Arctic maritime system, require accurate and precise navigational data," said Kathryn Ries, deputy director of NOAA's Office of Coast Survey. *"The sheer size of the task – the coast length of 921 nautical miles is really 2,191 miles of low tidal shoreline once you figure in the bays and inlets – demands a rigorous process of prioritization for NOAA surveying and charting."*

The reconnaissance survey will provide the information needed to determine NOAA's future charting survey projects in the Arctic. It will also tell the hydrographers whether depth soundings submitted by non-NOAA vessels meet the standards required for depiction on nautical charts.

Some of the small-scale charts in Alaskan waters use soundings from Captain Cook (1770s vintage) or even Vitus Bering (circa 1740). While it is difficult to pinpoint exact sources, some soundings could also come from British Admiralty charts or Russian Empire charts. Coast Survey hydrographic teams have been measuring ocean depths in coastal Alaskan waters since the 1870s, and many of NOAA's Alaskan nautical charts - especially in the Arctic - still rely on those depth measurements, many made with lead lines. Additionally, vast swaths of early Arctic measurement locations were based on celestial positioning.

Coast Survey has made it a priority to update Arctic nautical charts for the fairways, approaches, and ports along the Alaskan coast. ☆

Mapping the changes in ocean surface currents off the Northwest coast

by
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Currents in the ocean vary strongly in time and space. Waves, tides, winds, and even regional or seasonal variations in temperature, salinity, and surface height

cause the ocean currents to change from hour to hour, and from location to location. Navigators can tell when their vessels are being slowed or dragged off course by ocean currents. But without a "roadmap", it can be difficult to anticipate the currents that will speed or delay their journey, and use them to assist with a voyage.

Since 1997, the Ocean Currents Mapping Lab at Oregon State University has been charting the changing ocean surface currents on the Pacific Northwest coast, mainly along the coast of Oregon. Because this information can be helpful to ocean users, we have been making the results of our measurements freely available to the public through the Internet, beginning in 1999, and under NANOOS sponsorship since 2007 (http://currents.coas.oregonstate.edu; http://nvs.nanoos.org).

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Beyond navigation, knowledge of ocean currents is critical for man-overboard response. Reducing the time to locate a man-overboard strongly increases his chances for survival, against the growing risk of hypothermia. Even in fairly warm water (60-70°F), time to exhaustion is 3-12 hours, and time of survival is under two days (http://www.mobilarm.com/page/safety_and_survival.html). For searches that require hours to initiate, knowledge of the currents shrink the search area, in one recent simulation by a factor of two-thirds.

The land-based mapping system uses radio waves, at frequencies between AM and FM radio, to probe the ocean surface and measure the speed of ocean currents oriented directly toward or away-from the site. By combining measurements from adjacent sites, we can resolve the full two-dimensional currents in regions of overlapping measurements. (For details, please see http://currents.coas.oregonstate.edu/What.html).

We maintain eleven sites along the coast of the Pacific Northwest (Figure 1), six of which are "long-range" sites operating at 4-5 MHz with a range of 180km (red dots in figure), and five are "standard-range" site operating at 12-14 MHz, with a range of 50km, but with higher spatial resolution (green dots in figure). The receive antennas for all sites are about the same (Figure 2a), but the transmit antennas for the long-range sites (Figure 2b) are 40 feet tall, much higher than for the standard range sites.

Data are collected at each coastal site and returned by internet to a central processing facility at Oregon State University, where they are monitored, combined, archived, and displayed at the sites mentioned above. In addition, we contribute these data to a national data center, which creates maps for the parts of the entire U.S. coast with surface cur-

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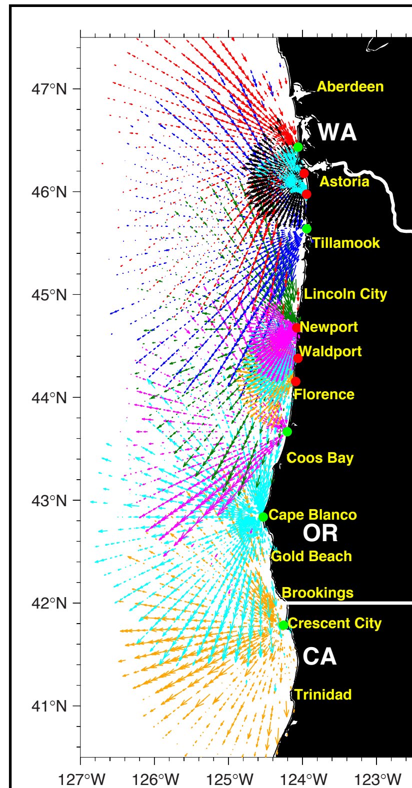

Figure 1: The surface current mapping array in the Pacific Northwest is shown. Red dots show the locations of long-range (150km) stations, and green dots show standard-range (50km) stations. Colored arrows show the measured "radial" currents, toward or away from each site, for one hour.

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rent mapping coverage.

A series of averaged maps, one every other day, shows the dramatic changes in ocean currents from day to day, both in time and in space (Figure 3). The colored arrows are the ocean currents (a rainbow color key indicates current speed; 100 cm/s = 2 knots). Data are available at much higher resolution than shown, but resolution in this map is reduced to help visibility. Wind measurements are shown as black arrows at three buoys (two on 5/15). Winds, initially out of the south, move currents toward the coast and northward along the coast on 5/15. Two days later, on 5/17, the winds have died, and the currents have weakened, and reversing to southward in the north. An eddy can be seen swirling off Heceta Head. On 5/19, the winds have reversed, and the currents are strong toward the south and west, with strongest currents in the north and much weaker currents off Heceta Head. By 5/21, the winds are not much stronger, but the currents have increased considerably to the southwest, with very strong currents north of Newport; currents are again much weaker off Cape Perpetua. Finally, by 5/23, the winds have again died, and the currents are much reduced, but continue to the southwest above Cape Foulweather, while showing a tendency to reverse inshore south of Newport (Kosro, 2005).

Figure 2: The antennas for (a) receiving and (b) transmitting radio waves at each site.

Looking at a larger area, Figure 4 shows the currents off the Pacific Northwest during a strong wind out of the north in June 2004. While coastal currents everywhere tended to the south or southwest on this date, four very strong jets formed off Astoria, Newport, Cape Blanco, and Crescent City. In these jets, the currents' speeds exceeded 80 cm/s (1.6 knots), while just 20 nm to the side, currents were smaller by a factor of three. The strong, offshore-tending current jets are repeatedly observed during spring-summer upwelling season.

Supplementing and extending the purely measured currents, ocean circulation models use wind and temperature forecasts, and "assimilate" the surface current mapping measurements and satellite data, to obtain forecasts of ocean currents and temperatures. This effort, also supported in part by NANOOS, is conducted by Alex Kurapov's group at OSU; their maps of predicted currents and temperatures are also available on the NANOOS web site.

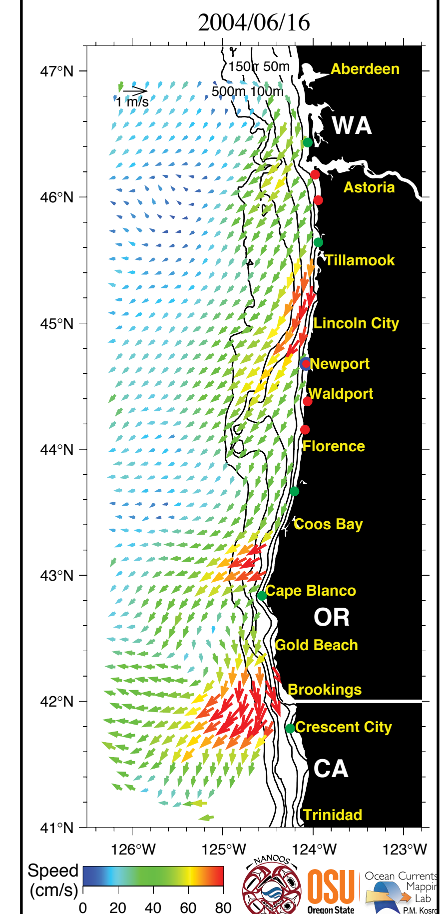
Our future plans, depending on future funding, include extending the array up the coast of Washington. When accomplished, this will provide a nearly continuous mapping system along the U.S. West Coast, from Mexico to Canada, producing surface current maps for public benefit under IOOS funding. ☆

References:

Kosro, P.M., 2005. "On the spatial structure of coastal circulation off Newport, Oregon, during spring and summer 2001, in a region of varying shelf width", J. Geophys. Res., 110, C10S06, doi:10.1029/2004JC002769.

website: www.nanoos.org

Figure 4: Daily averaged large-scale map of currents over full Oregon coast during a strong southward wind.



Note from Jan Newton, Ph.D.
Executive Director, NANOOS

One very important focus of NANOOS is to deliver data products relevant to maritime operations. We know this topic is of wide interest to the Master Mariner community. This issue, we are pleased to tell you about measurements of surface currents within NANOOS and the U.S. IOOS program. We note that these data are also of high utility to the other NANOOS focus areas of coastal hazards, ecosystem assessment, fisheries, and coastal climate. Surface current mapping for the nation is a priority of the U.S. IOOS program.

Figure 3: Surface currents (colored arrows) and winds (black arrows) averaged over successive 2-day intervals during May 2001 from standard-resolution array over Heceta Bank.