AOOS
The Eye on Alaska's Coasts and Oceans
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Update
Winter 2014

Using Gliders to Detect Marine Mammals

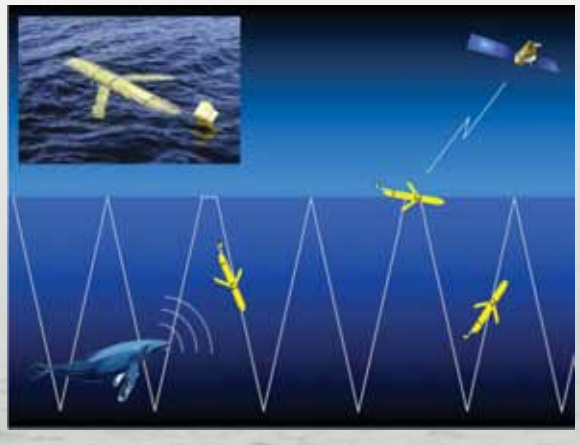
On a chilly September day 60 miles from shore, Hank Statscewich gazed out over the Chukchi Sea from the *Norseman 2* and cut a shiny yellow airplane-looking device loose from its tether. The device was a $160,000, 120 lb, autonomous underwater glider, which was designed to drift slowly away from the vessel in a mild saw-tooth profile through the water. Its mission was to record marine mammal calls and other sounds in real time. In a matter of seconds it was clear that something had gone terribly wrong- the glider sank its nose heavy into the water, rotated and came back to the surface nearly upside down, looking more like a dead fish than the sleek technological wonder that it was.

Fortunately Hank and colleague Peter Winsor (both from the University of Alaska Fairbanks) had encountered problems in the field before and troubleshooting came second nature. Within minutes, they had plucked the glider out of the 5-foot seas. "Stainless steel shackle might do… hand me some electrical tape…" The repair began. Despite meticulous testing in Fairbanks, it appeared they needed to move weight from the top of the glider to its underbelly while not putting too much weight fore or aft. After several more tries, some adjustment of the electronics, and a quick vacuum seal, they had the highly calibrated, fine-tuned instrument covered with taped shackles and back in the water. They hit the "dive" button and watched the glider sink slowly into the depths of the Chukchi. They breathed a huge sigh of relief.

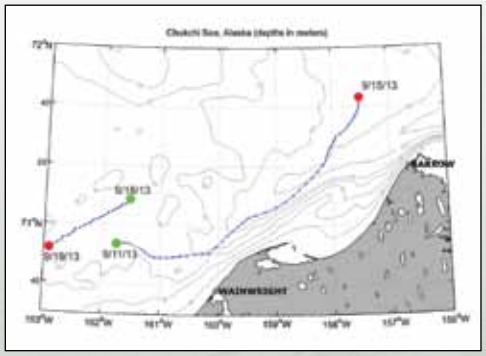
AOOS funding was used to develop an onboard call library to classify and identify what mammal species made which calls in real time, relaying this identification to shore via satellite. The call library consists of 32 call types produced by bowhead, fin, humpback, right, beluga, and killer whales, and walrus and bearded seals and was developed by Mark Baumgartner (Woods Hole Oceanographic Institute) and Kate Stafford (University of Washington). During its 7-day mission, the glider reported real-time detections of both bowhead whales and air guns used for geophysical exploration. In addition to real-time marine mammal detection and avoidance, noise classification and mitigation are potential applications for this library as the Arctic becomes increasingly noisier. ■

Hank Statscewich

Two underwater gliders equipped with acoustic and oceanographic instruments (and shackles) await their launch on the deck of the *Norseman II*.



An autonomous glider moves up and down in the water column in a sawtooth pattern while detecting, recording, and identifying marine mammal sounds. Upon surfacing, the glider transmits detection and identification data to shore via satellite.



The acoustic glider traveled from Wainwright to Barrow in the Alaska Coastal Current where it was recovered at the beginning of Barrow's fall whaling season. The glider was redeployed northwest of Wainwright for an additional 2 days

Kate Stafford

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New Sea Ice Atlas Illuminates Historical Conditions

What do whaling reports from the 1850s and satellite data have in common? They are both part of the data being incorporated into a new sea ice atlas of historical sea ice conditions in Alaskan waters, to be released in February. Funded by AOOS and developed by ACCAP and SNAP at UAF, the web-based atlas will display historical information for all regions of Alaska that experience sea ice (including Cook Inlet) dating back to the mid-19th century.

The electronic atlas will be publicly accessible and consist of sea ice grids and accompanying digital maps of sea ice concentration. The grids will be weekly from 1953-present, and monthly from 1952 back to the mid-19th century. Resolution will be approximately 20 km (¼° latitude by ¼° longitude).

"Shiny App" available now: Ice Atlas data are being used with wind information and sea ice output from global climate models to develop a new web-based tool allowing users to explore patterns in temperature and precipitation across time and space. Visit http://www.snap.uaf.edu/analysis_tools.php. ■

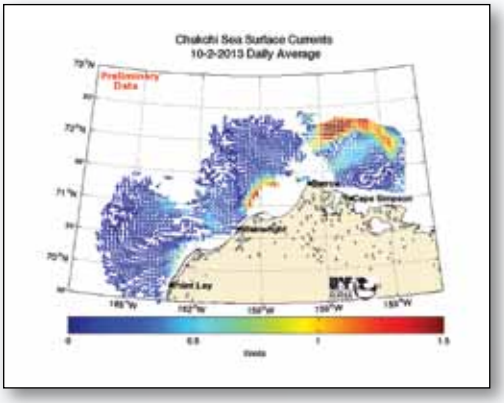
Designed to be user friendly for scientists and the public alike, the atlas provides insights into how sea ice extent and concentration have changed over time. The atlas is not intended for forecasting or prediction, but can provide useful historical context for future planning efforts.

HF Radar Provides Clues to Arctic Circulation and Corresponding Ecosystem Dynamics

With a coverage extending 70 miles offshore and about 270 miles along the coast, four high frequency radar systems dotted the North Slope this past summer. This effort provided critical real time surface current maps in the northeast Chukchi and western Beaufort Seas presenting an unprecedented view of the often complex circulation patterns in this region.

The systems at Point Lay, Wainwright, Point Barrow, and Cape Simpson are supported by AOOS, the U.S. Bureau of Ocean Energy Management, the State of Alaska Coastal Impact Assistance Program, and the Center for Island, Maritime, and Extreme Environment Security. Each of the radar installations benefited from the cooperation of village residents and corporations.

All data are transmitted in real-time and posted to publicly accessible websites (ww.chukchicurrents.com; http://cordc.ucsd.edu/projects/mapping/). ■



This map shows mean daily surface circulation on October 2, 2013. Winds were from the east at ~10 knots. Note the apparent current convergence where eastward flow from the central Chukchi shelf encounters westward wind-driven flow north of Wainwright. There is also a bifurcation* in the flow offshore of Wainwright where the current branches to the northeast and southwest. The southwestern branch recirculates into the central Chukchi Sea offshore of Point Lay, whereas the northeastern branch enters Barrow Canyon.

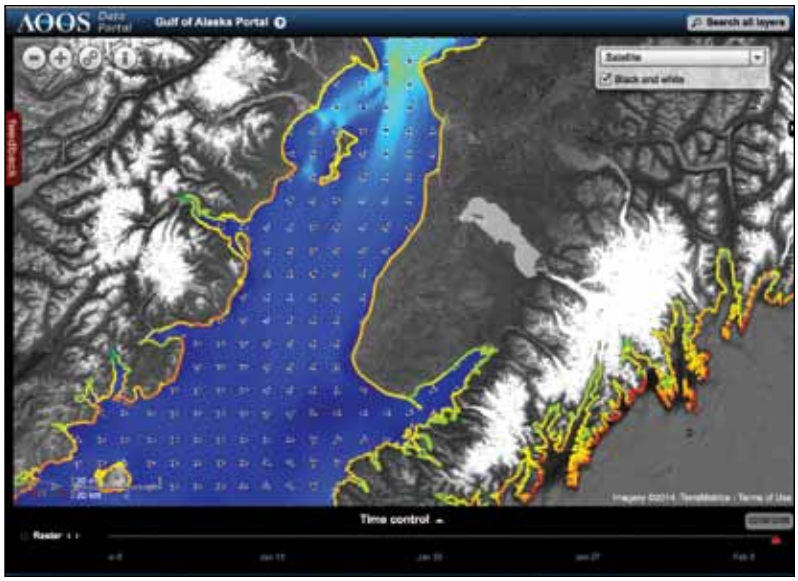
Mapping surface currents at the juncture of the Chukchi and Beaufort seas has been particularly enlightening. Here, the northeastward flow emanating from the Chukchi shelf (northeast of Barrow) merges with the westward flow on the Beaufort shelf forming an eddy offshore of Cape Simpson. Historical observations indicate that bowhead whales often feed in the area of the observed eddy. Additional analyses are needed to determine the frequency of eddy formation and the conditions under which they form. Eddies may aggregate zooplankton and thus enhance the feeding efficiency of bowheads.

* the splitting of a main body into two parts.

The Point Barrow shore station runs on wind and solar energy to power the radar in a remote setting.

A radar transmit antenna overlooks the Chukchi at Point Lay. *Rachel Potter*

New Gulf of Alaska Portal Available



These screenshots from the Gulf of Alaska Portal show currents from a NOAA Regional Ocean Model, biological wave exposure, and ShoreZone imagery

A new data tool quietly appeared in the AOOS drop-down menu this winter. With a similar interface as the AOOS Arctic Portal, the new Gulf of Alaska portal includes a broad array of marine and coastal data, including the Exxon Valdez Oil Spill Trustee Council's Gulf Watch Alaska and Herring Research & Monitoring programs. It also includes historical data from past Trustee Council projects. Users can access, integrate, and download datasets ranging from real time sensor feeds, satellite observations, habitat types, and project level data on fisheries, plankton, oceanography, marine mammals and seabirds. Want a vicarious trip to a specific mudflat or breeding bird colony? Try "flying the coast" using ShoreZone video and imagery which is also integrated into the portal. ■

Bering Strait Buoy Catches a Ride Home

Last July through October, a wave buoy streaming real-time information on sea state conditions in the Bering Strait provided data to transiting vessels, fishermen, and forecasters in the Norton Sound area. AOOS joined the University of Alaska Fairbanks, the Western Alaska LCC and the University of Victoria in a mission to assist village residents, National Weather Service forecasters, the U.S. Coast Guard, commercial and recreational ships, and others transiting the region known for extreme weather and strong currents. However, when unusually strong fall storms hit the region, the buoy's seasonal recovery became more challenging than expected. One by one, four potential vessels of opportunity sailed past, unable to stop to pick up the buoy.

On November 1, when the winds and waves relaxed, the R/V *Norseman I* successfully plucked the buoy from the strait, thanks to ship time donated by Olgoonik Fairweather. AOOS would like to send a sincere thanks to Olgoonik Fairweather, the crew of the *Norseman*, the crew of the other vessels willing to help, and everyone involved in the effort. We look forward to the return of the buoy to the region in 2014! ■

Photo courtesy of Olgoonik Fairweather

The buoy is brought onboard by the crew of the *Norseman* on November 1st.

Real Time Sensor Map Gets a Facelift

The AOOS data portal will usher in the New Year with a major upgrade to the real time sensor map. The sensor map is AOOS's most popular web-based tool, connecting to over 1,200 stations streaming real-time conditions from across the state. New features include:

- Faster load time for low bandwidth connections
- New base layers including NOAA nautical charts
- Sensors aggregate when zoomed out for easier viewing
- Statistics are generated from aggregated stations, based on zoom
- Multiple projections available including polar, Albers, mercator, and more
- Data from past week can be downloaded in excel
- Interactive timeline
- Now works on tablets! (iPhone app in the queue) ■

This screenshot shows the new hexagonal gridded format of aggregated wind sensors across the state. Users can see aggregated views by zooming out or individual stations by zooming in.

Cordova Tide Gauge: Now Measuring Salinity

This summer AOOS joined forces with the Prince William Sound Science Center and NOAA's Center for Operational Oceanographic Products and Services to add a conductivity sensor to an existing tide station in Cordova. This new collaborative approach for providing oceanographic measurements is helping to pave the way for other measurements to piggyback off existing monitoring systems. ■

Megan Roberts cleans the new conductivity sensor in Cordova.

AOOS Turns 10!

2014 will mark the 10th Anniversary of the Alaska Ocean Observing System. Keep an eye out for a year-long series of commemorative events highlighting marine research, stories, and successes of our partners and collaborators from the past decade.

Research Workspace Adds Users

The AOOS Research Workspace is a web-based data management solution for assembling, storing, and sharing data between scientists. In recent months, new user groups have included the Distributed Biological Observatory, the RUSALCA program, and the Arctic EIS (Ecosystem Integrated Survey). Other users include NPRB's Gulf of Alaska Integrated Ecosystem Research Program and two long-term programs funded by the Exxon Valdez Oil Spill Trustee Council. If your program or research group is interested in using the workspace, contact Rob Bochenek at rob@axiomalaska.com. ■

Industry Arctic Data Now Available

Historic weather, ocean observations and environmental information collected by three companies (Shell, ConocoPhillips and StatOil) since 2008 in the Chukchi Sea are now available to the science community and the public via the AOOS Research Workspace. To gain access to these datasets, contact Chris Turner at chris@axiomalaska.com. For more information about the industry projects, go to www.chukchiscience.com. The data sharing is the direct result of the NOAA-industry agreement signed in 2011. ■

Coming Soon: Community-based Monitoring Workshop

Citizen science, traditional knowledge, public participation in scientific research…these are all terms that can be included in what we now call Community Based Monitoring (CBM). Join the Alaska Ocean Observing System (AOOS) and Alaska Sea Grant Friday Feb 7 at the Alaska Forum on the Environment in Anchorage as they launch a project to identify and document best practices for new and ongoing CBM programs. This effort will help ensure they are high quality, culturally appropriate, meet local needs, are designed to actually collect data of value, and eventually return data to those collecting it. Join us for a more comprehensive two-day workshop in Anchorage April 1-2. For more information visit http://seagrant.uaf.edu/conferences/2014/community-based-monitoring/.

Ketchikan High School students Hana Oshima and Micah Briola look for invasive tunicates under a dock near the village of Saxman.

Deborah Mercy.