The strategy of ocean observing in Alaska

For almost a decade, AOOS has been working with state, federal and private groups to strategically establish and maintain moored weather buoys and ocean sensors, as well as land-based surface current radar and SnoTel stations all over the Sound.

These instruments measure phenomena such as the speed and direction of wind and ocean currents, water temperature, salinity, and precipitation. We use these data to create complex numerical simulations, or models, of the atmosphere and ocean. We are now refining the models to the point where they can more accurately mimic the phenomena indicated by the observed data—and then forecast what will happen if a variable changes. This information will be used in products needed by fishermen, boaters, recreationists, resource managers and others to make better decisions about how to use the ocean environment.

AOOS builds and facilitates partnerships

As the Alaska regional node for a national network of observing systems, AOOS is taking a lead role to promote partnerships among groups active in marine research and monitoring in Alaska, including Prince William Sound. Partnerships are important for leveraging funds, sharing information, promoting collaborations and finding solutions to the challenges of meeting the needs of stakeholders and data users and providers.

This project includes California Polytechnic State University, Micro Specialties, Inc., NASA Jet Propulsion Lab, Natural Resources Conservation Service, NOAA National Data Buoy Center, Oil Spill Recovery Institute, Prince William Sound Regional Citizens’ Advisory Council, Prince William Sound Science Center, Texas A&M University, University of Alaska Anchorage, University of Alaska Fairbanks School of Fisheries and Ocean Sciences, UC-Santa Barbara, University of Maine, and the U.S. Coast Guard.

The 2009 field experiment

In summer 2009, AOOS will evaluate regional forecast models for their effectiveness in predicting wind, waves, and ocean circulation in Prince William Sound. We will:

- deploy drifting buoys throughout the Sound to measure the speed and direction of surface currents, and measure how well the model predicts ocean conditions
- follow the tracks of buoys that mimic Coast Guard Search and Rescue targets and oil spill trajectories
- deploy autonomous vehicles to fly and swim the Sound, collecting data as they go

Follow the field experiment online at www.aoos.org

Field experiment data will be uploaded in near-real time, thanks to the efforts of the UAF School of Fisheries and Ocean Sciences and the NASA Jet Propulsion Lab.

About Prince William Sound

The Sound contains approximately 3,500 miles of coastline, including hundreds of islands. Montague Strait and Hinchinbrook Entrance are its two gateways to the Gulf of Alaska.

The Sound is used extensively by transoceanic shippers, oil tankers, state ferries, fishing boats, cruise ships, sailboats, and kayaks, and is relatively protected from severe weather in the adjacent Gulf of Alaska. It takes in large, seasonal additions of fresh water from rivers and melting glaciers that result in rich marine habitat for plankton, fish, marine mammals, and people.

Sound Predictions 2009

Ocean observing and its applications in Prince William Sound, Alaska

Mariners need solid weather forecasts, especially when conditions turn marginal. AOOS weather forecasts can be scaled to the local needs of mariners in the Sound because its weather data come from one of the world’s densest networks of observation platforms.

With 20+ weather stations operating within a 40 square-mile area, AOOS weather stations can deliver the real-time measurements of actual weather conditions so important to anyone going out on the water. AOOS ocean current models predict the trajectories of anything drifting in the sea, including disabled vessels, overboard crew, and cargo. Read More >>

Improving our ability to observe and forecast changes in Alaska’s oceans

The Alaska Ocean Observing System is building a network of observation platforms and forecast models that will provide information products and tools to improve our understanding of Alaska’s ocean ecosystem and allow us to make better decisions about our use of the marine environment.
Prince William Sound and Surroundings

Instruments operate in the Sound year-round except for AUVs and gliders, which will be used only during the 2009 Field Experiment.

High-frequency radar

The 5m mean tidal range in the Sound can create powerful currents. When it’s windy, the velocity of these currents can magnify waves to dangerous heights. High-Frequency (HF) radar uses Doppler frequency shifts to determine the speed of surface currents. HF radar stations are able to transmit and receive radar waves traveling as far as 60km (37 miles) across the Sound.

C-MAN weather stations

Coastal Marine Automated Network (C-MAN) stations measure barometric pressure, wind speed and direction, air and sea temperatures, water level, waves, relative humidity, precipitation, and visibility.

Oceanographic moorings

Water exchange between the Gulf of Alaska and the Sound influences the abundance and distribution of plankton, which form the base of the marine food web. Anchored to the ocean floor, moorings continuously measure temperature, salinity, and current velocity.

AUVs and gliders

Autonomous underwater vehicles (AUVs) and gliders can be deployed to collect nearly continuous measurements of temperature and salinity. These measurements contribute to regional coastal water column structure to 200m depth, and help evaluate and improve the performance of ROMS, the Regional Ocean Modeling System.

Drifters

Surface current information is critical to oil spill response and search and rescue efforts. Drifters (deployed at the surface) and drags (deployed ten meters underwater) are strongly influenced by wind speed and circulation. Should dispersants be used following an oil spill in the central Sound, results suggest that the trajectory and fate of subsurface oil would likely differ considerably from the trajectory and fate of untreated surface oil.

Weather forecasting on a Sound scale

The Sound has a dense array of networked observing platforms, with more than 20 weather stations reporting real time data within an area of 100km2.

The Alaska Experimental Forecast Facility uses the Weather Research and Forecasting (WRF) model and the North American Mesoscale Weather Research and Forecasting (NAM-WRF) model to predict weather. National Weather Service (NWS) models can forecast for areas of about 12 km2, but these models allow for forecasts for areas as small as 4 km2. This finer resolution allows capture of topographic effects that are not in the NWS model.

The WRF model predicts air temperature, freezing level, precipitation, air pressure, relative humidity, sea spray icing, and snow depth.

AOOS directly benefits user groups

AOOS contributes to safety at sea by helping commercial fishermen and transoceanic shippers stay informed about ocean and weather conditions. AOOS also provides customized data products for the oil spill response community and US Coast Guard search and rescue teams.

We link educators from formal and informal settings by creating exemplary educational resources for use in and outside of Alaska. We work with local communities, including Alaska Native groups, that make their living from the sea by providing relevant environmental data for daily decision-making.

Goals of the Alaska Ocean Observing System

- To improve safety and efficiency of marine operations
- To mitigate effects of natural hazards
- To improve predictions of climate change and its effects on coastal populations
- To improve national security
- To reduce public health risks
- To protect and restore healthy coastal marine ecosystems
- To enable sustained use of marine resources

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