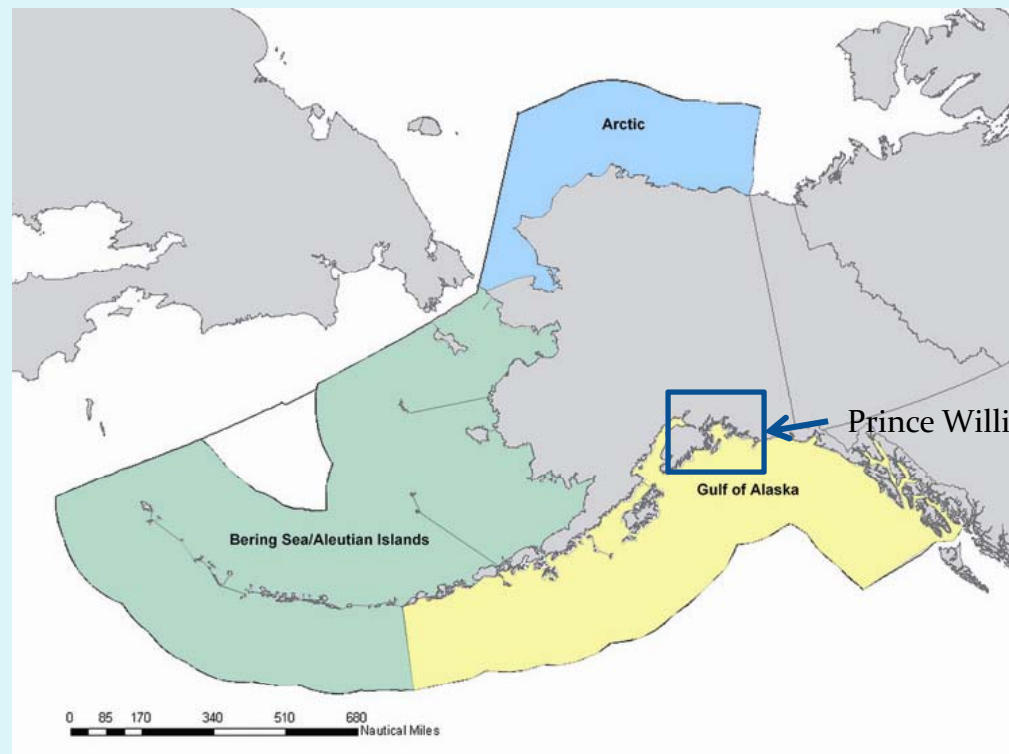


Outreach and Education for the Alaska Ocean Observation System Prince Williams Sound Field Experiment: Sound Predictions 2009





Prince William Sound

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AOOS
Alaska Ocean Observing System

Sea Grant
Alaska



Prince William Sound, Alaska



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Summer, 2009: A Field Experiment was Planned in PWS for the AOOS

- How well can our models predict atmospheric and oceanic water properties, wave conditions, and circulation patterns in different areas of the Sound?
- Has the circulation model forecast skill for the central basin improved from those in 2004?
- Duration: 15 days, July 19 – August 3
- 15 partner organizations, data collection and computer processing at multiple locations.



The Outreach and Education Team

- AOOS: Molly McCammon, Nora Deans, Caroline Rosner, Darcy Dugan
- COSEE Alaska: Marilyn Sigman
- Alaska Sea Grant/MAP: Tori Baker
- Prince William Sound Science Center: Leslie Abramson (NOAA intern), Lindsay Butters, Alice Douwang
- Stephanie Hoag, educational consultant
- The scientists: Carl Schoch, Scott Pegau, Yi Chao



“The 2009 Prince William Sound Field Experiment”

Was Branded

“Sound Predictions 2009”



Opportunity: The Stakeholders



Commercial Fishing



Coast Guard
Search-and-Rescue



Tourism & Recreation





1989



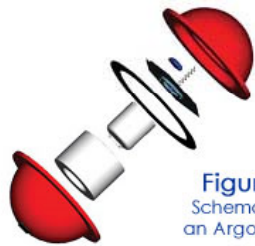


Figure 1
Schematic of
an Argosphere



Figure 2
SVP Drifter



Figure 3
Micro star
Drifter

Drifters

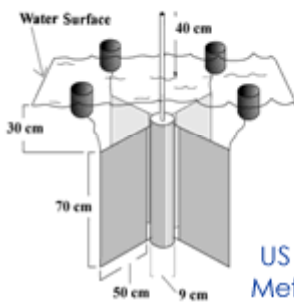


Figure 4
US Coast Guard
Metocean SLDMB

Opportunity: The Toys



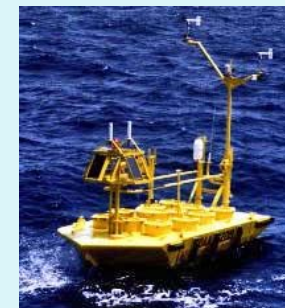
Glider



AUV



HF Radar



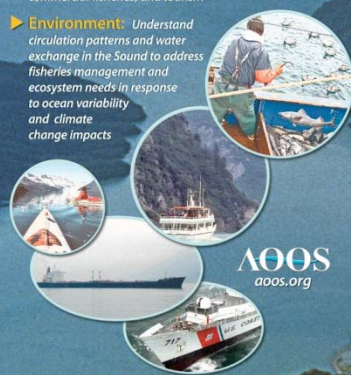
Moorings

ALASKA OCEAN OBSERVING SYSTEM
The eye on Alaska's coasts and oceans

Sound Predictions

Ocean observing
and its applications in
Prince William Sound

- **Safety:** Provide more precise wind, wave, and ocean current forecasts
- **Economy:** Provide tools to resource managers for informed decisions on oil and gas development, commercial fisheries, and tourism
- **Environment:** Understand circulation patterns and water exchange in the Sound to address fisheries management and ecosystem needs in response to ocean variability and climate change impacts



AOOS
aooos.org

part of a global network of ocean observing

Media Products

The strategy of ocean observing in Alaska

For almost a decade, AOOS has been working with state, federal and private groups to strategically coordinate and maintain essential weather, ocean and water resources, as well as to build a robust network of coastal and border stations all over the Sound.

These resources monitor phenomena such as the speed and direction of wind and ocean currents, wave composition, salinity and productivity. We use these data to create a comprehensive picture of the state of the ocean and its resources. We are working to make it possible for the public to see these resources, and the changes that are taking place in the Sound, and to use this information to make better decisions. The information will be used to provide input to policy, science, management, and other decisions and to make better decisions about how to use the ocean resources.

AOOS builds and facilitates partnerships

In the Alaska region, AOOS is the central network of observing systems. AOOS is a network of coastal and inland observing systems that are coordinated and managed by the Alaska Ocean Observing System. AOOS is a network of coastal and inland observing systems that are coordinated and managed by the Alaska Ocean Observing System. AOOS is a network of coastal and inland observing systems that are coordinated and managed by the Alaska Ocean Observing System.

The 2009 field experiment

In summer 2009, AOOS will conduct a large-scale field experiment to test the effectiveness of predicting wind, wave, and ocean currents in Prince William Sound. We will use a combination of satellite, ship-based, and shore-based observations to create a comprehensive picture of the state of the ocean and its resources. We will use these data to create a comprehensive picture of the state of the ocean and its resources.

Follow the field experiment online at www.aooos.org

Field experiment data will be available to the public in near real-time. AOOS is the official data source for the Alaska Ocean Observing System and the NOAA Sea Grant Program.

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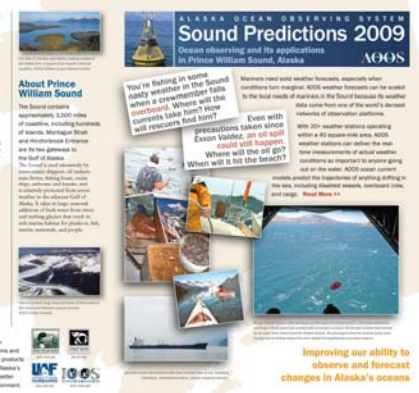


Exhibit & Rack Card

Press Event
Valdez Community Event
Alaska Ocean Fest, June

Brochure

Mail-out
Online



Newspaper Centerfold for Ferry and Cruise Ship Passengers



DELTA-SOUND CONNECTIONS

IT'S 3am and a FISHERMAN NEEDS TO KNOW WHAT the WEATHER WILL BE LIKE for PRINCE WILLIAM SOUND over the next 48-HOUR FISHING WINDOW.

Mariners need good weather forecasts—especially when conditions turn marginal. National Weather Service weather modeling data are scaled for the entire Sound, making accurate forecasts difficult for smaller areas.

The Sound has one of the world's densest networks of observation platforms, with more than 20 weather stations within an area of 40 square miles.

Because of this dense network, AOO's Prince William Sound Observing System forecasts can be better scaled to the needs of local mariners. AOO's weather stations provide more surface observations that tell us how well the models are performing, and also provide real-time measurements of actual weather conditions.

ALASKA OCEAN OBSERVING SYSTEM

Prince William Sound Field Experiment 2009

A demonstration of ocean observing

This summer, the Alaska Ocean Observing System and the Oil Spill Recovery Institute of Cordova 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 forecast model predicts ocean conditions. We will follow the tracks of buoys that mimic Coast Guard Search and Rescue targets and oil spill trajectories. We will also deploy autonomous vehicles to fly and swim the Sound, collecting data as they go.

Goals of the Ocean Observing System

To provide physical and biological information to the people of the Sound, and to learn more about what drives its ecological variability.

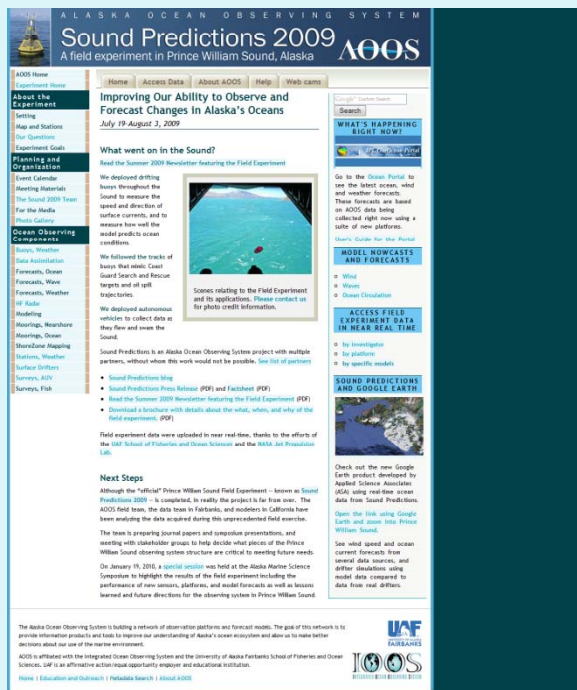
Autonomous and powered vessels will monitor ocean conditions and provide data to local weather forecasters for coastal and ocean operations, including safety. It also has science research and training goals to help understand the Sound's ecosystem of Fish & Game and to help decision-makers on food safety, production, and fishing.

Mariners: If you have other data or questions, please call the Alaska Office of Marine Safety at 907-546-2100. We will have a radio network to monitor the Sound's weather and ocean conditions.

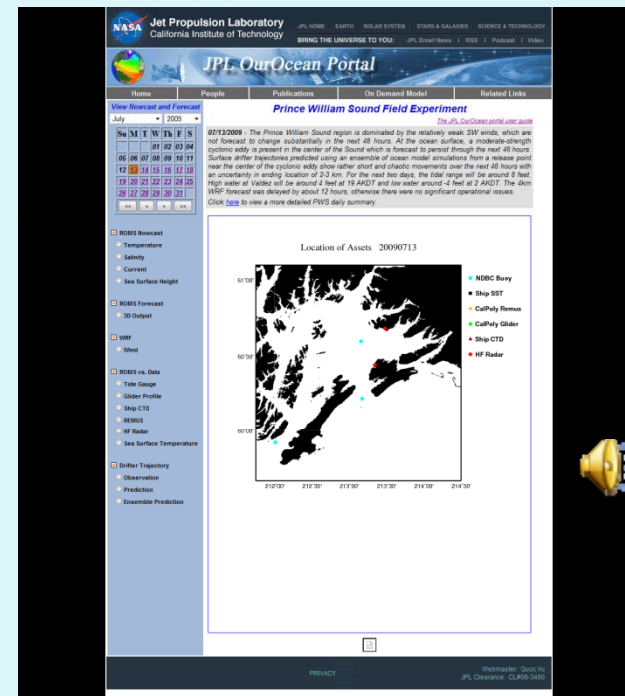
Instruments

- SNOTEL weather stations** (SNOTEL stands for Surface Network of Temperature, Precipitation, and Wind). These stations measure temperature, precipitation, wind speed and direction, and other data. The station on Mt. Baker, near Cordova, also includes the water column of the atmosphere. Station on Fisher Island, near Port Townsend, and Natchik will measure the water column of the atmosphere.
- High-frequency radar** The station on Mt. Baker, near Cordova, also includes the water column of the atmosphere. Station on Fisher Island, near Port Townsend, and Natchik will measure the water column of the atmosphere.
- GOOS-NAN weather stations** (GOOS-NAN stands for Global Ocean Observing System - North American Network). These stations measure temperature, precipitation, wind speed and direction, and other data. The station on Mt. Baker, near Cordova, also includes the water column of the atmosphere.
- GOOS-NAN weather stations** (GOOS-NAN stands for Global Ocean Observing System - North American Network). These stations measure temperature, precipitation, wind speed and direction, and other data. The station on Mt. Baker, near Cordova, also includes the water column of the atmosphere.

AOOS Outreach Webpages and JPL Data Portal



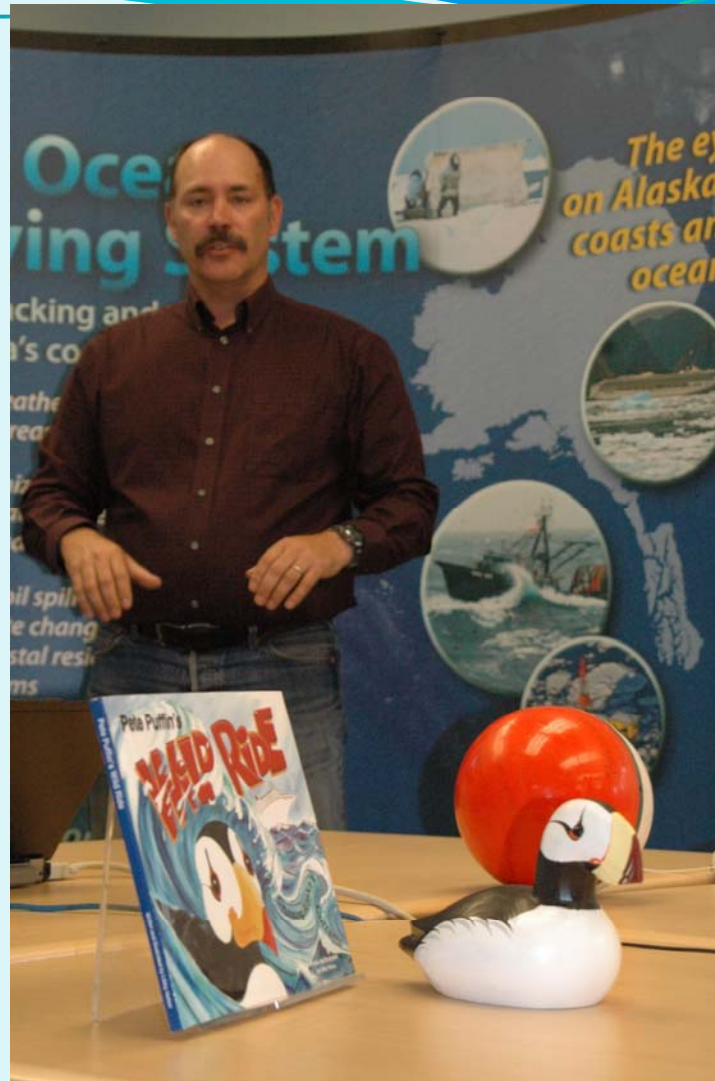
<http://www.aoot.org>



<http://ourocean.jpl.nasa.gov/PWS>



Kick-off Press Event & Press Packets in Anchorage on July 16



Media + Community Event in Valdez



Scientist Presentations

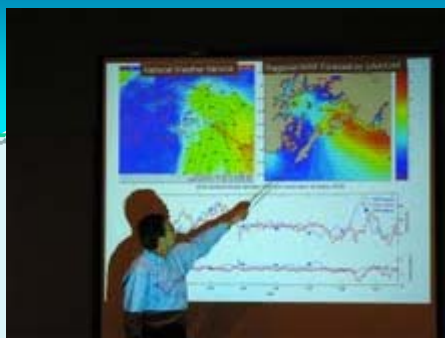


Boat Tour in the
Harbor



Build-your-own ATV
Activities in the Harbor





Open House Event
in Cordova



Alaska Sea Grant
Marine Advisory Program Office
Downtown Cordova

Community Information
Center in Cordova





Scientist Blogs



Podcast Sound Tracks



Challenges

- **Before and during the experiment:** How to translate a complex experiment about a complex environment into accurate and significant understandings about the nature and purposes of ocean observing.
- **After the experiment:** How to use the experiment to increase awareness and use of AOOS data and information by non-scientists, e.g., educators, the fishing community, recreational boaters.



Podcasts & Videos

- Two 9-minute “Ocean Gazing” podcasts produced by Ari Daniel Shapiro, COSEE NOW (online)
- Ten short videos produced by Deborah Mercy, Alaska Sea Grant (available online)
 - Overview of the Experiment by Scott Pegau
 - AUVs: Slocum Glider and Remus “Torpedo”
 - Scientists talking about their work; including four female graduate students or early career scientists



“What We Did and Learned” Newsletter

ALASKA OCEAN OBSERVING SYSTEM
AOOS
The Eye on Alaska's Coasts and Oceans
www.aos.org

Update
Summer 2009

Sound Predictions 2009

A demonstration of the Alaska Ocean Observing System in Prince William Sound

AOOS provides access to real-time weather and ocean observations as well as model generated forecasts for Prince William Sound (PWS) and other coastal Alaska regions from one data portal, www.aos.org.

In July and August 2009, AOOS partnered with NASA, the Oil Spill Recovery Institute, the University of Alaska and many other local and national organizations to sponsor a field experiment in the Sound. The objective was to test the accuracy of model forecasts and demonstrate the utility of an ocean observing system for oil spill response, search and rescue, and fishery management.

Developing the observing infrastructure in PWS, the statewide data management system, and forecast models took five years to complete and together with the Field Experiment brought together more than 65 scientists from eight states.

Observing System Components

The ocean observing system in PWS includes a dense spatial array of tide-gauged weather stations, wave gauges and ocean sensors, including salinity and temperature recorders, current velocity profilers, and sensors to measure chlorophyll fluorescence. Instruments were used to develop and test the performance of numerical models for forecasting weather, waves, and ocean conditions.

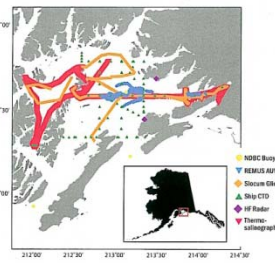
This experiment was designed to evaluate how well the models could predict actual conditions. The experiment supplemented the fixed array of AOOS instruments with radar surface current measurements, vessel mounted instruments for measuring temperature and salinity, underwater drones to profile the water column, and drifting buoys to measure current direction and velocity.

The experiment focused on validating models of surface and deeper currents in the central basin. The field team collected nearly 100 tracks of drifting buoys during a two week period that spanned spring and neap tides. Most drifter deployments occurred within the field of view of radar surface current measurements. Additional deployments occurred around the perimeter of the Sound to validate the velocity of surface currents forced mostly by fresh water runoff from melting snow fields and glaciers.

Participants also had opportunities to test new sensors and platforms, and to evaluate models in the context of other questions or applications such as fishery management, oil spill response, and search and rescue.

1007 West 3rd Avenue
Suite 100
Anchorage, AK 99501
907-644-6703

Right: Locations of the various sensors and platforms during the two-week field experiment.



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AOOS
Alaska Ocean Observing System

Sea Grant
Alaska



4 Middle School Teaching Activities

The screenshot shows the AOOS website with a navigation menu on the left and a main content area. The navigation menu includes: Home, Main Menu, Drifting Along, Overview, Adrift, Make Your Own Currents, Plotting the Currents, Design a Drifter, Teacher Background, and Home. The main content area is titled "Alaska Ocean Observing System Lesson Plans" and includes sections for "Exploring and Observing Alaska's Ocean", "Drifting Along", "Swimming with Gliders", and "Changes in the Ocean".

Drifting Along

For grades 6-8

Engagement:

Adrift! (1 class period)

- What are drifters and how are they used?
- How do advances in technology help scientists?

Students engage in an introduction to drifters and their uses as they view a short "Man Overboard" video and acquire knowledge of drifters to use in a game.

Exploration and Explanation:

Make Your Own Currents (1-2 class periods)

- What causes ocean surface currents and how do they move?
- How do movements of different types of drifters vary?

In Activity 2A Make Your Own Currents, students explore and analyze wind-driven surface currents and the movements of drifters in a hands-on simulation of currents.

Exploration and Explanation:

Plotting the Currents in Prince William Sound (1-2 class periods)

- How did scientists study currents studied in Prince William Sound, Alaska?
- How do scientists develop and test numerical models?
- How is data from drifters used to find their tracks (where they move and how fast)?

In Activity 2B Plotting the Currents in Prince William Sound, students find and use data from the Alaska Ocean Observing System (AOOS) to plot the tracks of drifters used by scientists as real-time data to compare with computer predictions during a field experiment to test a circulation model for Prince William Sound, Alaska.

Elaboration

Design a Drifter (4-7 class periods)

- How can your knowledge of drifters, currents, and real scientific experiments be used to design your own drifter and a plan to use it in an experiment?

In Activity 2C Design a Drifter, students use what they have learned to design, construct, and test their own drifter and explain how they will use it in an experiment.

Extensions and Additional Suggestions

Extension

Evaluation



| | |
|--|---|
| Class Time Required | 7-10 class periods |
| Materials Needed | See each activity |
| Teacher Prep | See each activity |
| Vocabulary | Drifter, drifting buoy, deploy, physical oceanographer, model (numerical or mathematical), Greenwich Mean Time, geostrophic, submergence, float, drogue, hydrophone, salinity |
| Prior Student Knowledge | Drifter track plotting: understanding of latitude and longitude, ability to plot or find locations on a map. Ability to read a decimal number to ten thousandths. Ability to work cooperatively in groups |
| Alaska Science GLEs Addressed | 6 th grade: SA 1.1, 1.2, 3.1, SE 2.1, 2.2, 3.1, SG 2.1, B 7 th grade: SA 1.1, SE 2.1, SE 3.1, SG 2.1, B 8 th grade: SA 1.1, SE 2.1, SE 2.2, SG 2.1, B |
| NSES Standards Addressed | A. Science as Inquiry E. Science and Technology |
| Ocean Literacy Principles Addressed | 1b, 7b, 7d |

"Drifting Along" Activity



The Activities Use Cool Toys & Data from the Experiment

[Home](#)
[People](#)
[Publications](#)
[On Demand Model](#)
[Related Links](#)

[View Nowcast and Forecast](#)

July 2009

| | | | | | | |
|----|----|----|----|----|----|----|
| Su | M | T | W | Th | F | S |
| | | | 01 | 02 | 03 | 04 |
| 05 | 06 | 07 | 08 | 09 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

☒ ROMS Nowcast

- ☐ Temperature
- ☐ Salinity
- ☒ Current
- ☐ Sea Surface Height

☒ ROMS Forecast

- ☐ 3D Output

☒ WRF

- ☐ Wind

☒ ROMS vs. Data

- ☐ Tide Gauge
- ☐ Glider Profile
- ☐ Ship CTD
- ☐ REMUS
- ☐ HF Radar
- ☐ Sea Surface Temperature

Prince William Sound Field Experiment

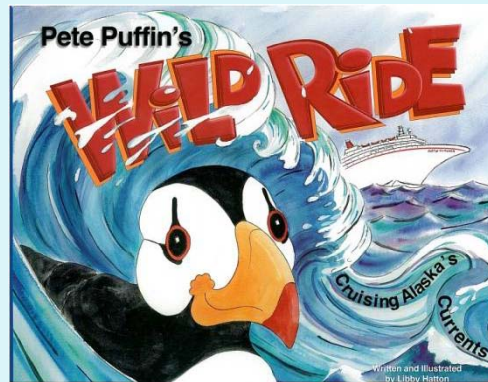
[The JPL OurOcean portal user guide](#)

Current Nowcast

The Prince William Sound (PWS) ocean forecasting system is based on the Regional Ocean Modeling System (ROMS). The ROMS configuration used ... [more](#)

| File Name | File Size | Download | View |
|---|-----------|----------------------|--|
| <input checked="" type="checkbox"/> pws_das_2009071300.nc | 13807704 | http | Header Image |
| pws_das_2009071306.nc | 13807704 | http | Header Image |
| pws_das_2009071312.nc | 13807704 | http | Header Image |
| pws_das_2009071318.nc | 13807704 | http | Header Image |

Current (cm/s) at 0 m for 07/13/2009 at 0 GMT



Coming Soon!
Lesson plans for Grades 2-6

