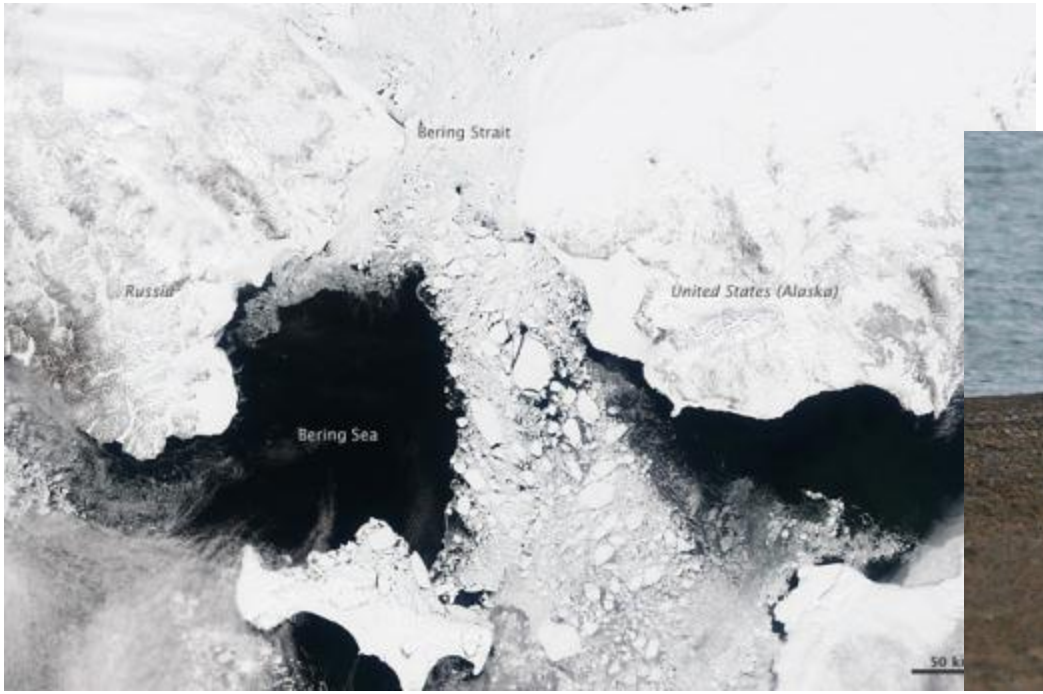
Future needs and plans for ocean observing in the Arctic



Zdenka Willis
Integrated Ocean Observing System
National Program Office
August, 2013

U.S. IOOS®

Enables decision making every day

Fosters advanced in science and technology

By:

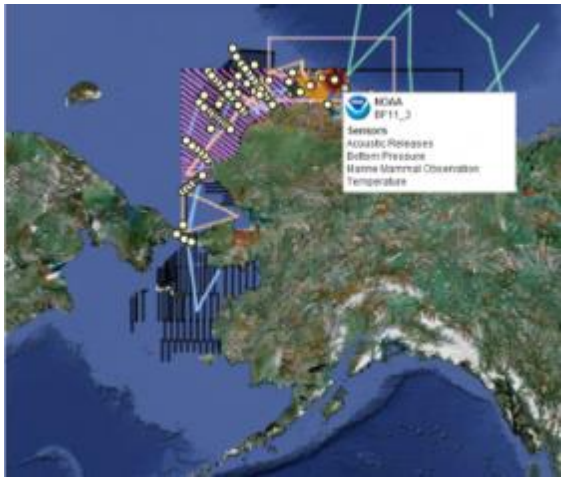
Linking Federal Agencies with IOOS Regions to increase the # of observations

Leverage information from disparate sources into tailored products

- ❑ **A national program comprising 17 federal agencies**
- ❑ **11 Regional Coastal Ocean Observing Systems**
- ❑ **Observing, Data management, modeling and analysis**

What is AOOS?

- IOOS Region with the mission of observing the ocean in 4-D and providing easy access to marine data
- Governed by board: state & federal agencies, research entities, industry

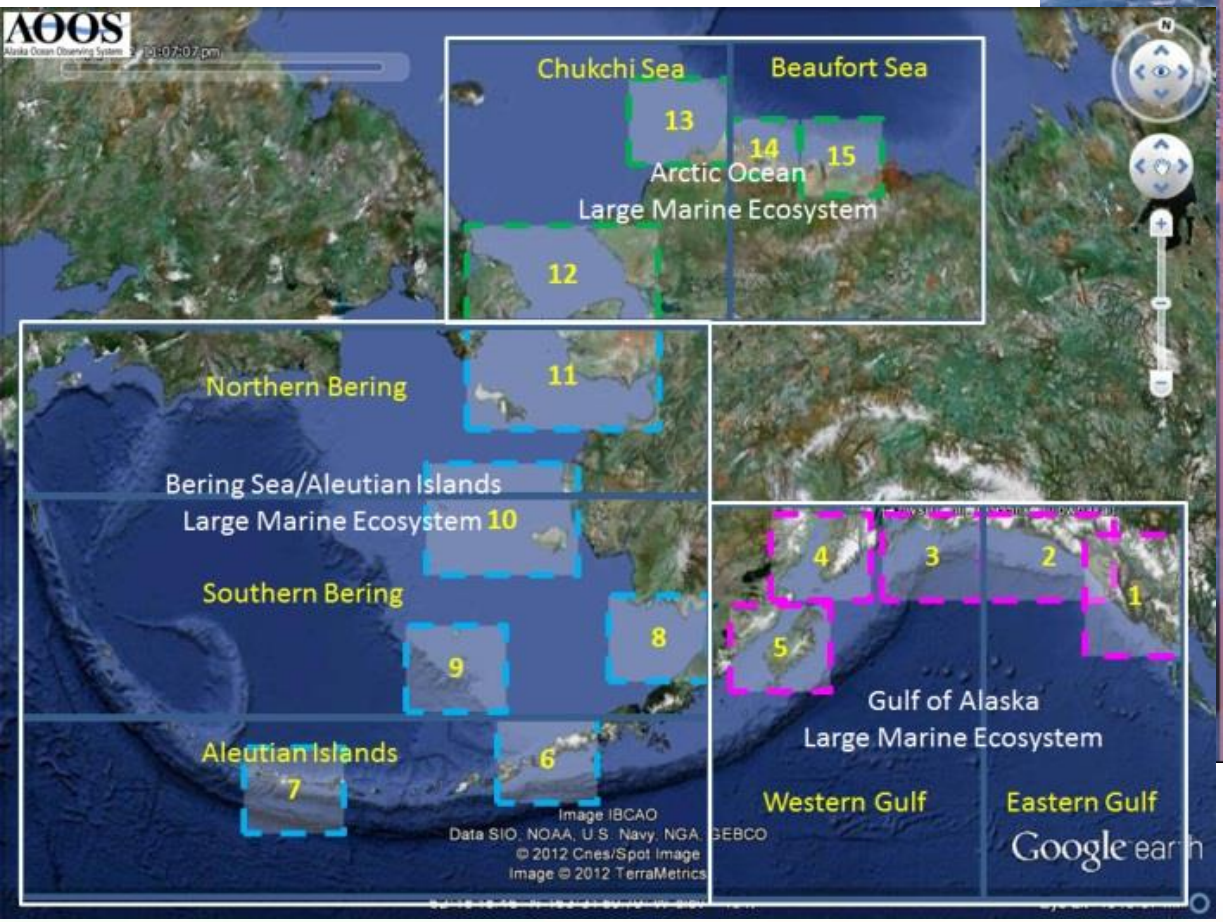


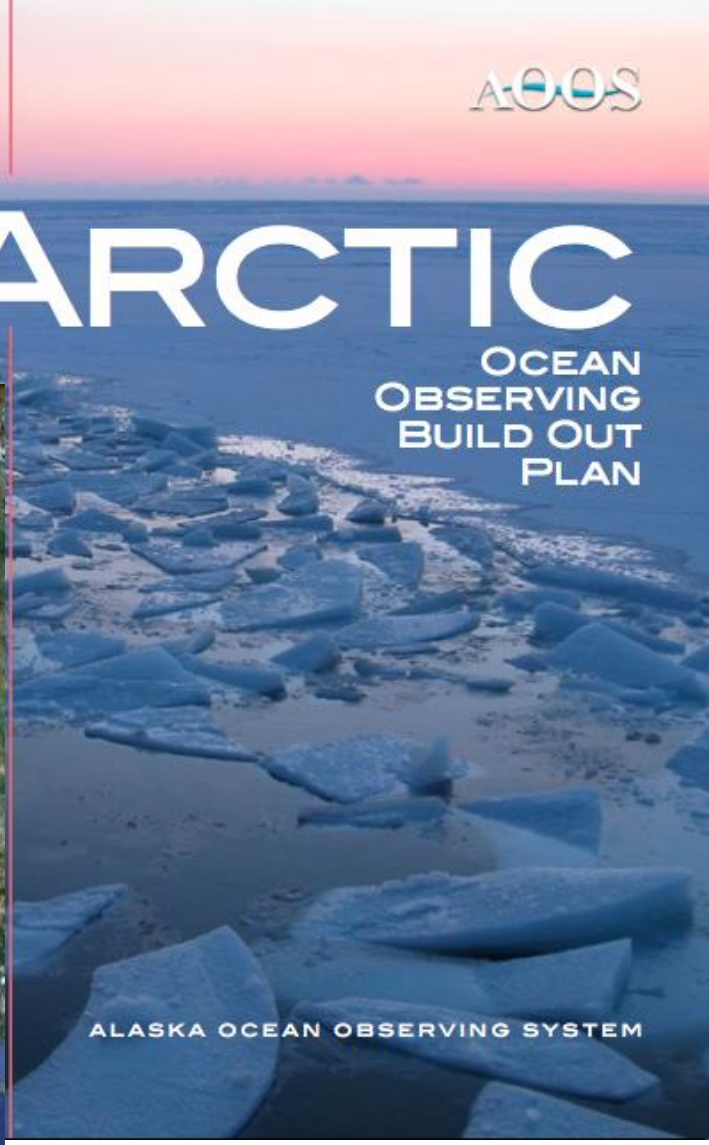
- Primary Activities:
  - Host a centralized data clearing house with web-based tools and data products
  - Work with marine users to fill gaps in ocean monitoring
  - Foster collaborations to meet multiple stakeholder needs

AOOS Goals in the Arctic

- Increase ocean & coastal observations in U.S. Arctic; fill the gaps
- Make Arctic data more accessible and useful
- Develop information products for stakeholders & decision-makers

Arctic Observing Plan





IOOS®

AOOS
Alaska Ocean Observing System

What does AOOS do?

Marine Operations

- Maintain weather stations, wave buoys, radars & forecasts
- Add weather stations to AIS transmitters

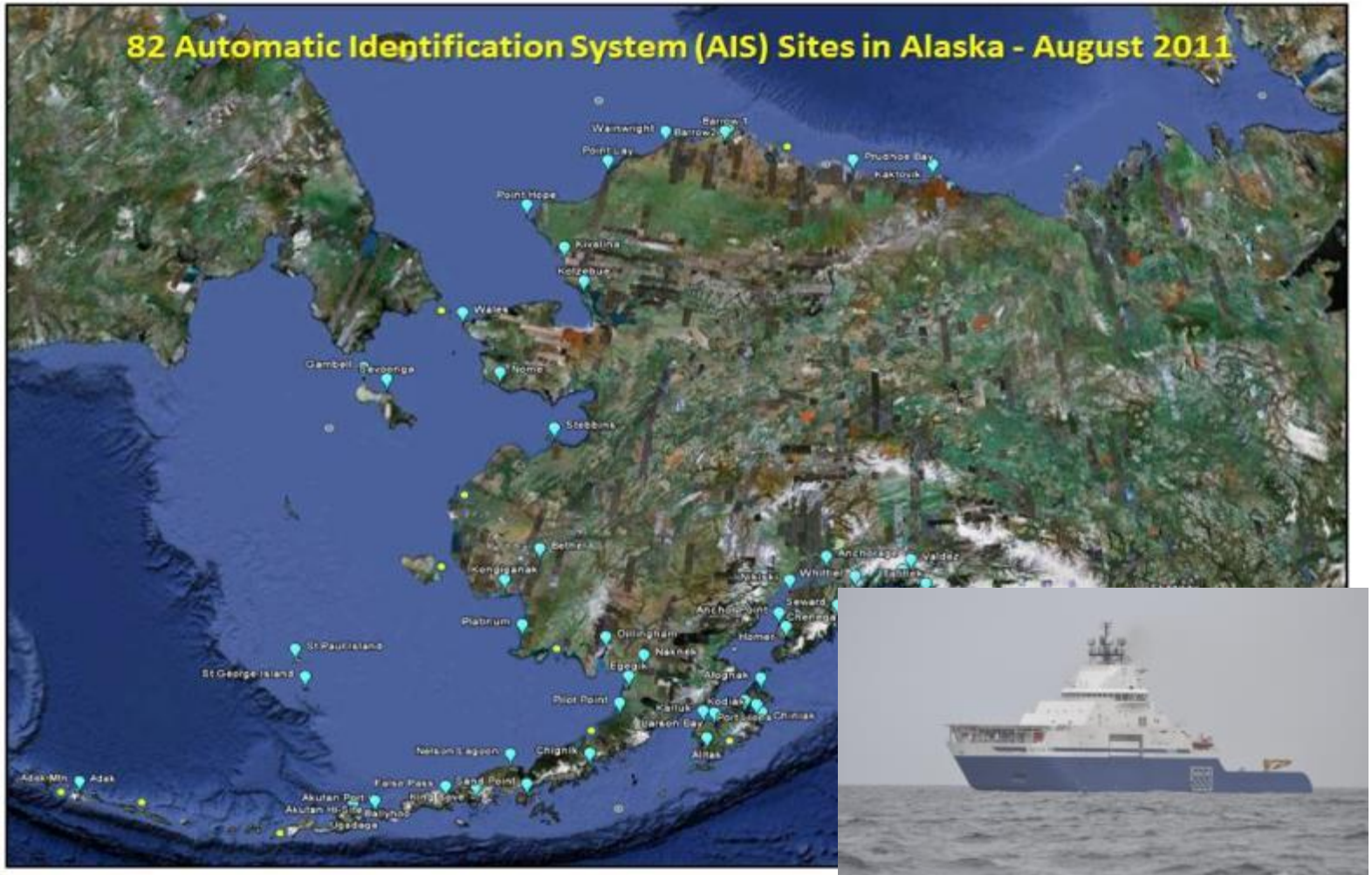
Coastal Hazards

- Support tide gauges, wave buoys, coastal beach profiles
- Develop electronic sea ice atlas: 1850s to present
- Piloted harbor observing systems in Seward & Kodiak

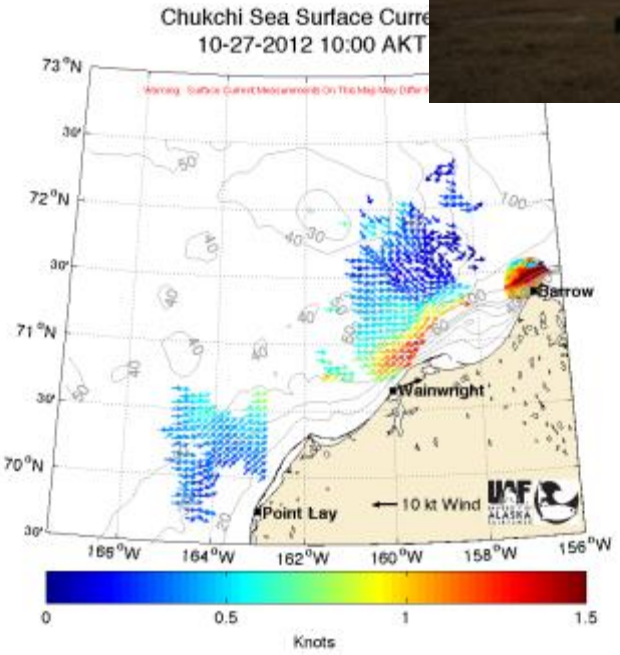
Ecosystems & Climate Trends, Fisheries & Water Quality

- Support Seward Line: longest time series in AK
- Ocean acidification: support mooring network; pilot OA forecast in Gulf of Alaska, test sensor at Seward hatchery
- Support glider lines & new mooring in Chukchi: test glider hydrophone to record marine mammal calls
- Facilitating animal tagging network for Arctic

Adding weather to AIS stations

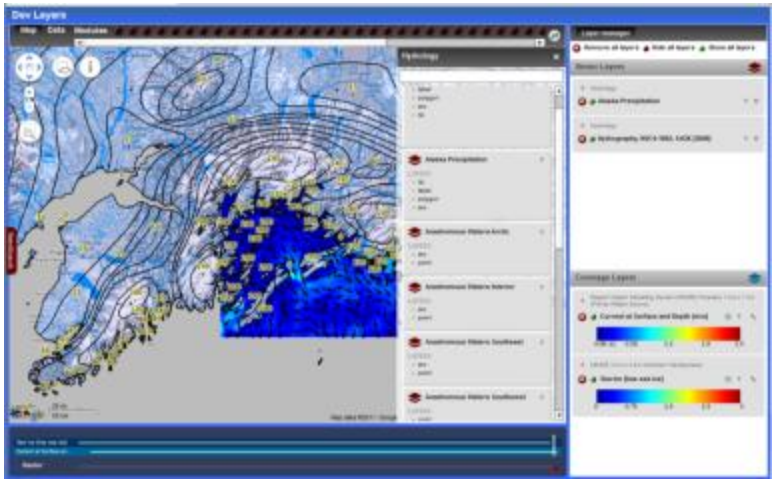


High Frequency radars



AOOS Ocean Portal

- Linking AOOS data applications
- View multiple types of data on one interface
  - Sensors
  - Models
  - Remote Sensing
  - GIS & project data
  - In-situ observations
- View time ranges for each layer
- Download data sets simultaneously
- Follow links to data sources
- Useful for government & industry planning
- **Public access to industry data**
- **Organized by LMEs: Arctic, Bering Sea/Aleutians, Gulf of Alaska**

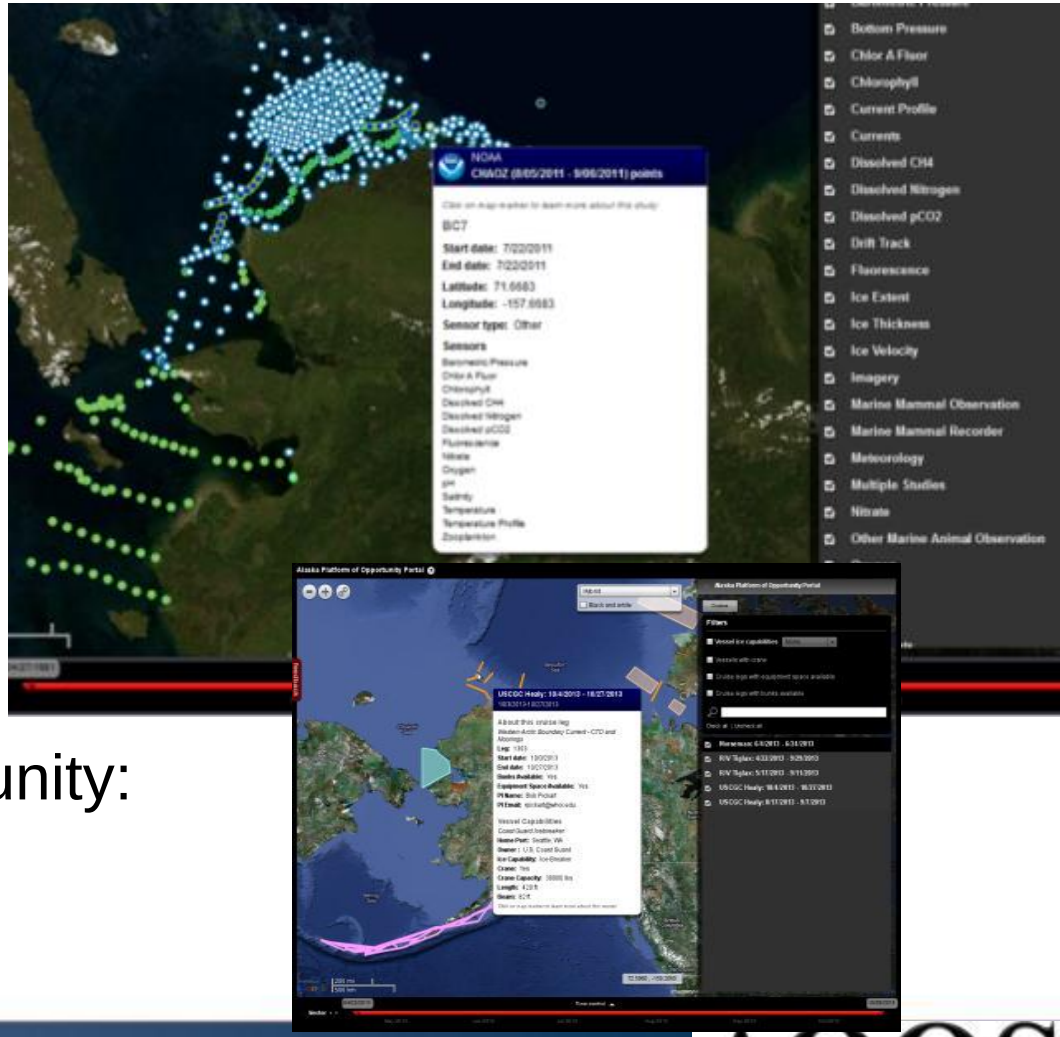


Research Assets Map

What instruments are deployed and what are they collecting?

<u>Goals of the map</u>

- Assist research planning
- Reduce duplication of effort
- Avoid collisions
- See holistic picture



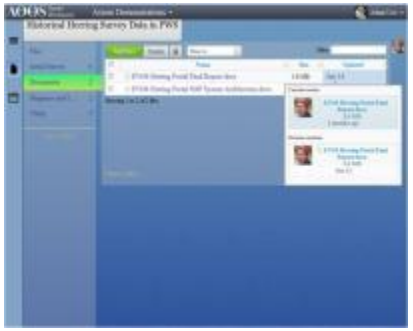
Started in the Arctic,
now expanding statewide

Includes Platform of Opportunity:

- Research vessel schedules & opportunities

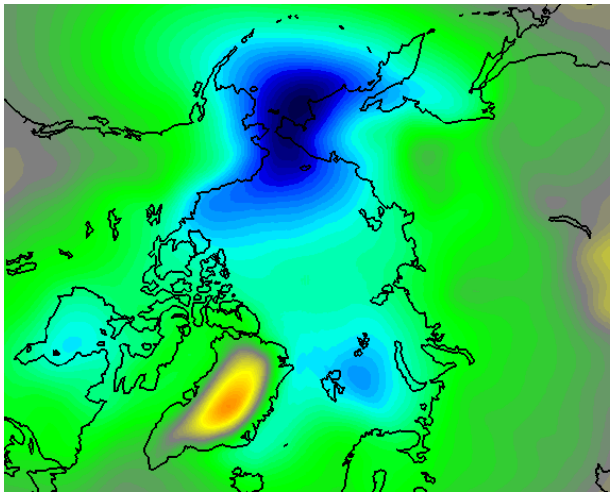
Research Workspace

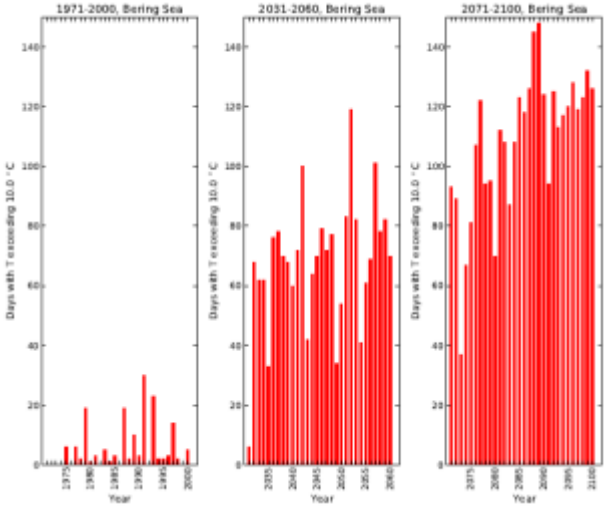
- Web-based data management system for assembling, storing, and sharing data between members of biological and physical oceanography communities.
- Users can:
  - Create projects
  - Create metadata
  - Upload data (drag and drop)
  - Share or download data
  - View all projects, folders, and files uploaded by other group members
  - Track history of data management within the project
- Next steps: automated archive to NODC, incorporate data into AOOS Ocean Portal Search Tool, publish to completely public access
- Groups: Gulf Watch AK, GOAIERP, RUSALCA, DBO, Arctic EIS



Downscaled climate model projections

- High-resolution spatial fields of temperature, precipitation and wind for entire Alaska coast
- Downscaled future scenarios for 21st-century time-slices
- Addresses potential impacts of these changes in context of a changing sea ice cover
- Partnership with AK Center for Climate Assessment & Policy: Available in December 2013





Digital Sea Ice Atlas

Sea ice atlas for Alaska waters

The Alaska Center for Climate Assessment and Policy (ACCAP), the Alaska Ocean Observing System (AOOS), the National Weather Service Anchorage Office (Sea Ice Desk), the National Snow and Ice Data Center (NSIDC), and NOAA's Pacific Environmental Marine Laboratory (PMEL) are working together to produce a digital sea ice atlas by 2013.

Coastal communities, marine navigation, industry (fishing, tourism, offshore resource extraction), the military, and Earth/Arctic system science research have all expressed a clear need for an Alaska sea ice atlas. Indeed, many requests for historical and climatological sea ice information for Alaska coastal waters presently go unanswered because such an atlas does not exist. The availability of GIS software, in-house expertise and historical databases extending back to the 1850s makes the construction of an Alaska sea ice atlas timely and feasible.

The atlas consists of digitally-stored sea ice concentration data on a grid covering all Alaska coastal waters to a distance of ~500 km (300 mi) from shore, with a spatial resolution of 25 km. The time resolution is monthly for the period 1850s-1950s, and weekly for the period from the early 1950s to 2010 with the allowance of subsequent updates.

Photo courtesy of K. Wood

Objectives

- Maximize available information of historical sea ice conditions in Alaska.
- Produce a long-term database to provide a perspective on current changes in sea ice.
- Allow easy online access to data with supporting software.

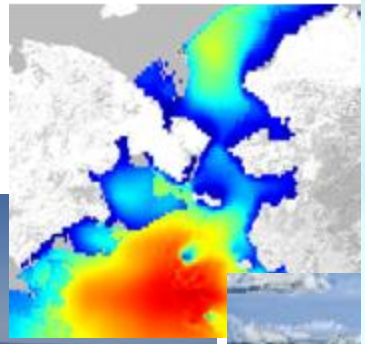
IOOS®

AOOS Alaska Ocean Observing System

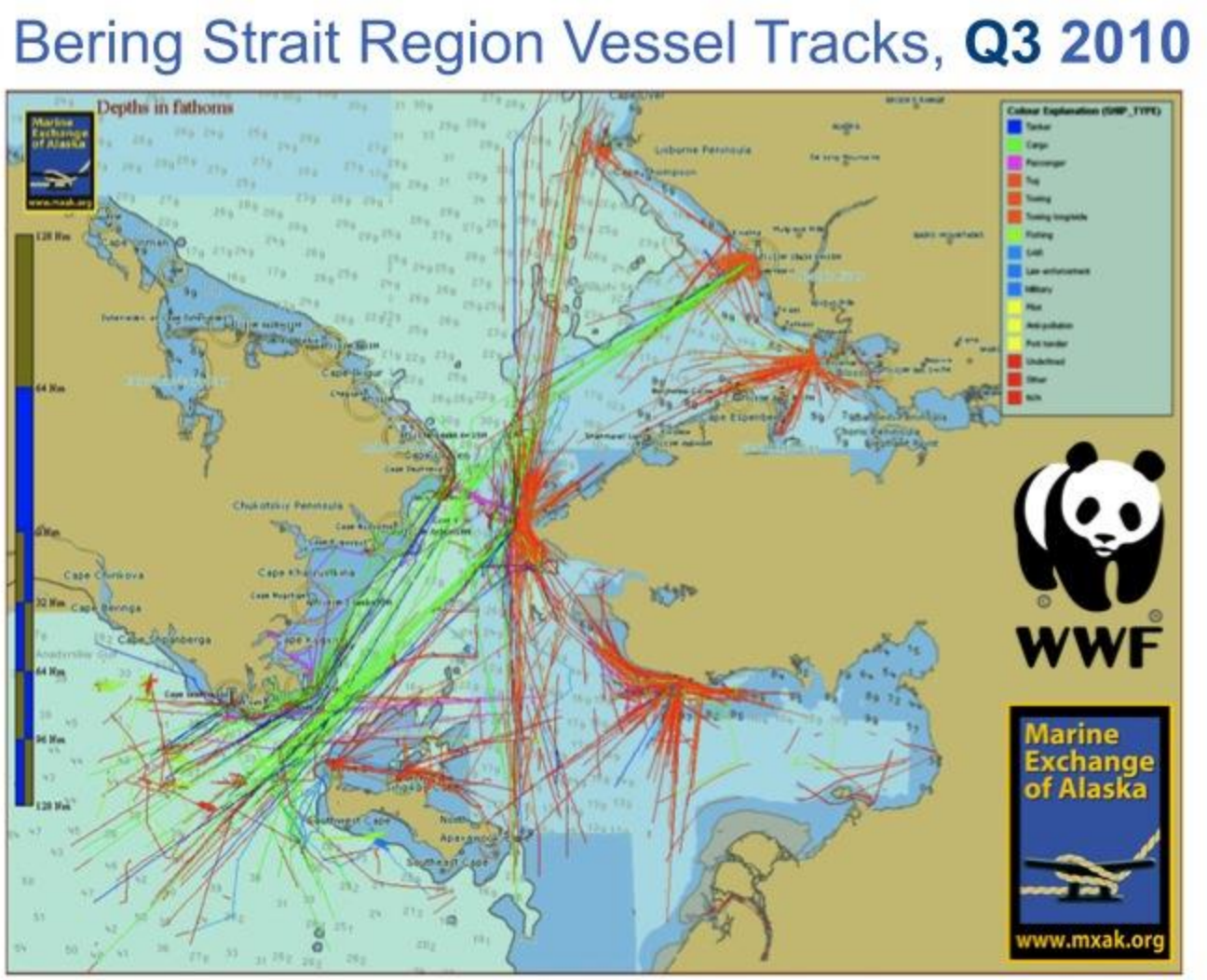
STAMP Project

Spatial Tools for Arctic Mapping & Planning

- Strong state support for data integration
- Data for decision support: human uses,
  20 year climate scenarios, environmental (physical, biological, chemical)
- Based on: What info do stakeholders need to plan for potential commercial fisheries in Arctic?
- What tools do decision-makers need? Scenarios? Cumulative impacts?
- No. Bering & Chukchi Seas
- Includes socio-economic data



Goal: Expand STAMP to Bering Sea shipping lanes



Final thoughts

- Need to coordinate & integrate the Arctic data portals, including at international level
- Need to develop clear operational needs for Arctic observations
- No one entity can do it all: need partnerships