



National Oceanic and Atmospheric Administration's

National Weather Service



*Enhancements to the
NWS Alaska Region Sea Ice Program*

**4th Symposium on the Impacts of an
Ice-Diminishing Arctic on
Naval and Maritime Operations**

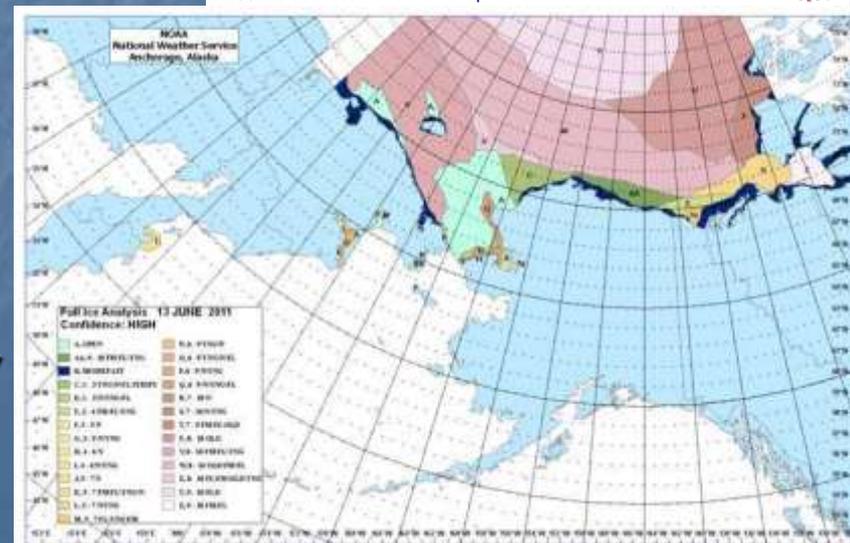
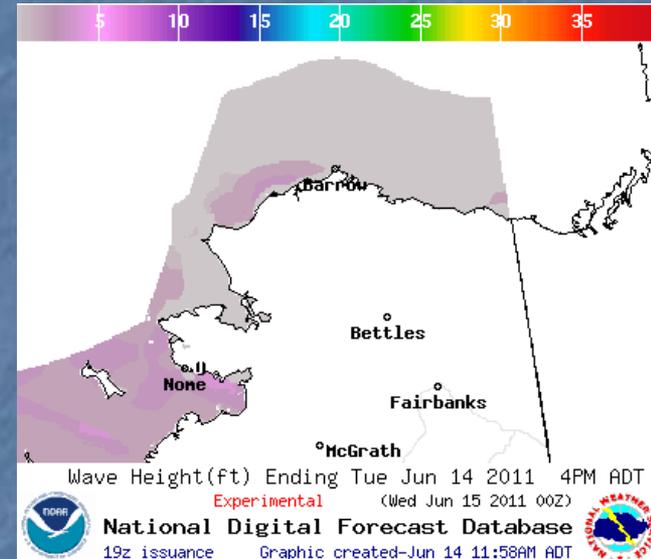
Tuesday 21 June 2011

Dr. Frank Kelly
Director, NOAA/NWS Alaska Region

Alaska Sea Ice Program

Sea Ice Services

- **Sea ice analysis and outlook**
- **Impact Based Decision Support Services (IDSS)**
 - Spot support for Search & Rescue (SAR)
 - Hazardous Material Release (HAZMAT)
- **Direct contact with mariners for delivery of critical information and collection of volunteer observations**
- **Integrated in the marine forecast and warning services for the Bering, Chukchi and Beaufort Seas**



Alaska Sea Ice Program Customers

■ Government

- Department of Homeland Security (DHS)-US Coast Guard (USCG)
- Local and Borough Governments
- State of Alaska – DHS and Emergency Management (DHS&EM), Department of Natural Resources (DNR), and Department of Transportation (DOT)
- Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)

■ Industry

- Fishing Fleets (Bottom fishing, Trawlers, Crabbers)
- Oil and Gas
- Mining and Mineral Extraction
- Marine Transportation and Shipping
- Native Corporations
- Tourism

■ Research

- University of Alaska – Fairbanks (UAF)
- NOAA Office of Oceanic and Atmospheric Research (OAR)



Alaska Sea Ice Program Today

- Focused on the Tactical – Day 1 to Seasonal
- Graphics and Text year round
 - Sea ice analysis
 - Sea surface temperature analysis
 - Sea Ice Advisory
 - Five day sea ice forecast
- Seasonal Outlook based on “Yeargroup”
- Integrated into marine weather forecasts across Alaska Region forecast offices
- IDSS Example: Sea Ice for Walrus Outlook (SIWO)



Sea Ice for Walrus Outlook (IDSS)

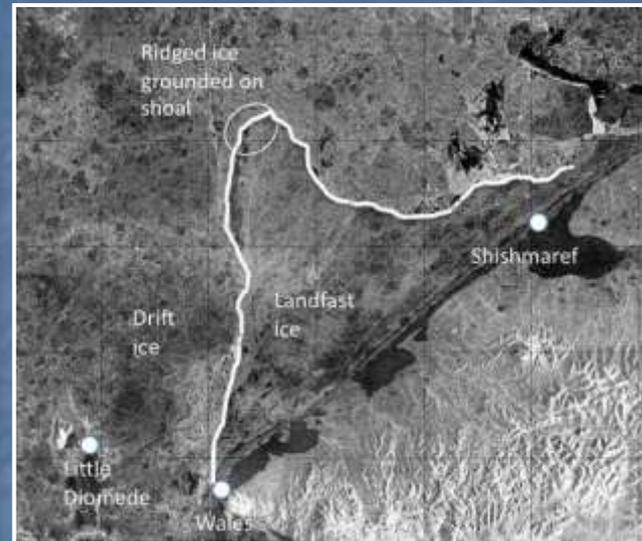
SEARCH Science
 Science Team
 Science Questions
 Data
 Related Links
 Sea Ice Outlook
 Management
 Media Coverage
 Meetings
 2008 Outlook Archive
 2009 Outlook Archive
 Related Websites

SEARCH Projects
 Observing/ION
 ION Design and Implementation
 Understanding Arctic Change
 SEARCH Database
 Development of SEARCH
 Steering Committee
 Forum
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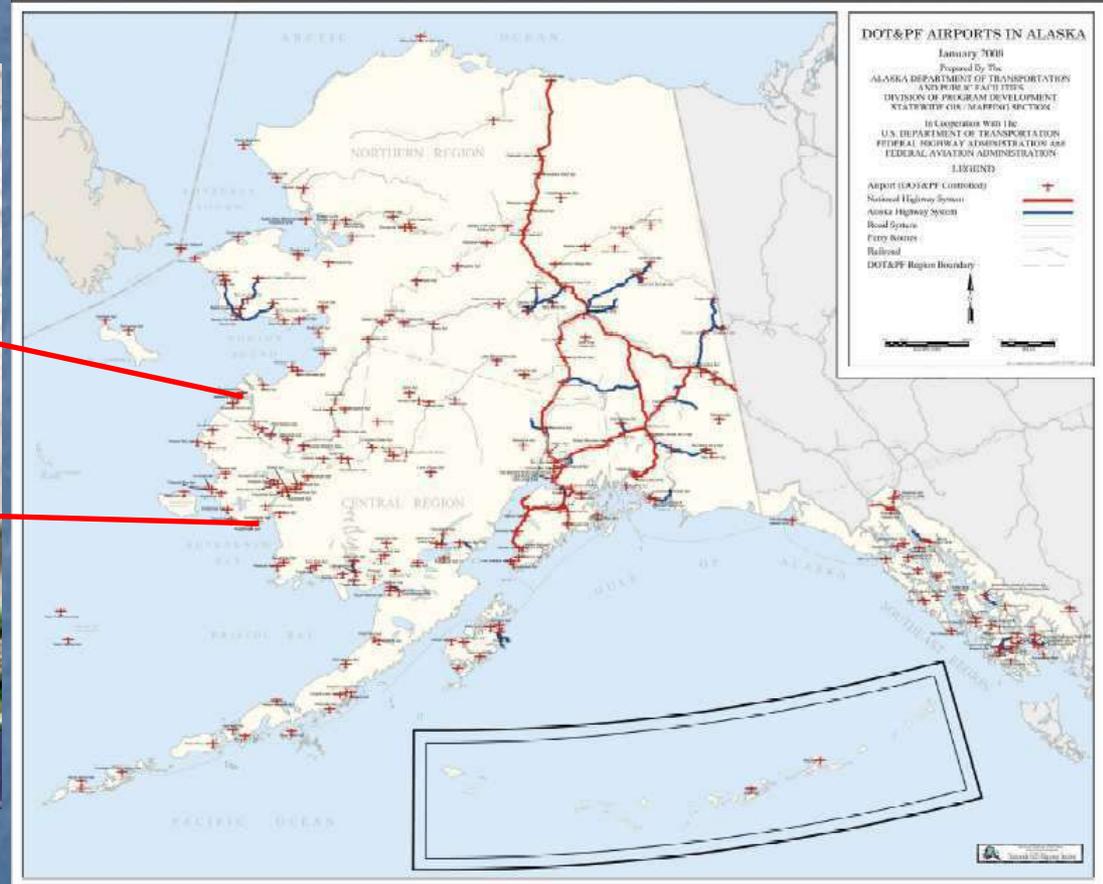
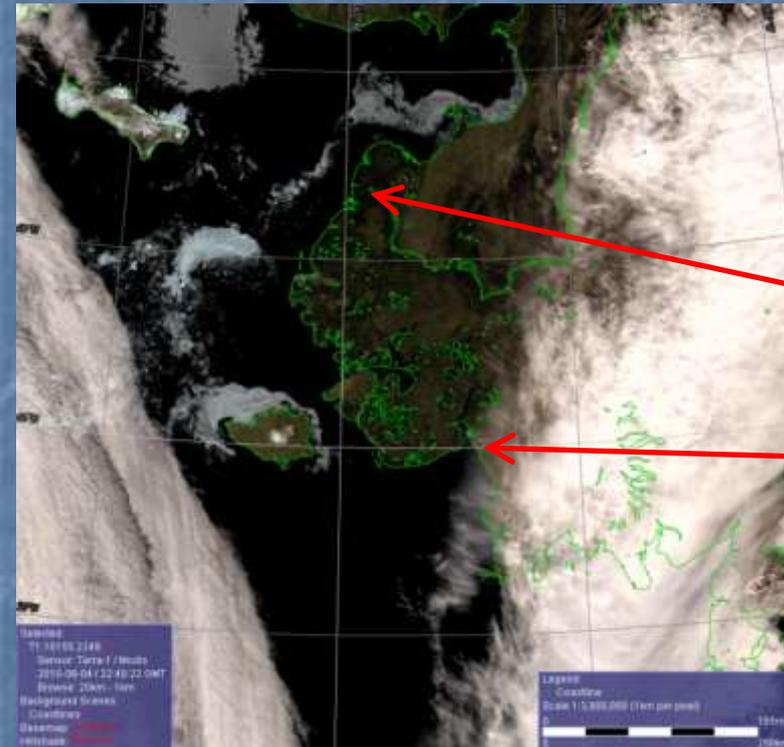
Friday, 4 June 2010 - Sea Ice for Walrus Outlook
 Weekly Outlook
 Date: Friday, 4 June 2010
 Assessment of Current Ice Conditions Relevant to Distribution and Access of Walrus:
Near St. Lawrence Island
 Sea ice continues to melt rapidly in the northern Bering Sea. However, there are remnants of shorefast ice along the north shore of St. Lawrence Island between Gambell and Savoonga. There is a large concentration of pack ice offshore of the shorefast ice just east of Savoonga extending northward about 20 miles. 5-7 tenths of sea ice present east and southeast of the island consists of round floes. "Last ice" is now drifting in bands from the Gulf of Anadyr northward toward the Bering Strait. A major band of the sea ice is about 20 miles southwest of Gambell, and extends all the way back to the southern Gulf of Anadyr. Everywhere else there are widely scattered floes in open water.
Wales to Shishmaref
 The rugged shorefast ice continues to hold between Wales and Shishmaref. Radar satellite imagery shows some grounded, ridged ice that is trapping the ice along the shore. Offshore of the shorefast ice there are widely scattered floes drifting northward through the Bering Strait in lots of open water.
5 and 10 Day Outlook: June 9 to June 14
 Winds (15-20 knots) will vary in direction over the weekend as low pressure in the area begins to break down. High pressure will build over the northern Bering Sea and Bering Strait early next week as that winds in general should be 20 kts or less after June 9th through the 14th. Nighttime temperatures for the area should remain above freezing after June 9th. These higher air temperatures will help melt the scattered floes still in the area.

Remainder Severe Warnings
 St. Lawrence Island/Bering Strait: Bering Sea/Southern Chukchi Sea:



- Enhance communication with villages and provide for hunter safety
- Additional sea ice observations
- Understand climate change impacts
- Better understand weather information needs and dissemination limitations
- Development of Decision Support Impact Catalog

Resupply to the Alaska Interior (IDSS)



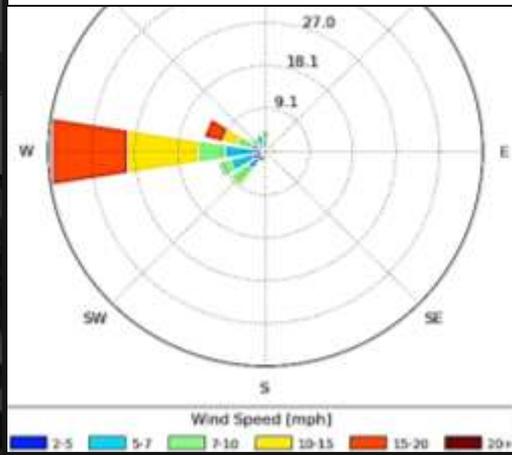
Supply Chain Management - Fuel and food for rural Alaska

Sea Ice Damage Kotzebue May 2011

May 27, 2011 - Shorefast locked in place



May 28 – Jun 2, 2011
Windrose Kotzebue, AK



Ice Breakup in Kotzebue can turn damaging when winds combined with high tide push ice onshore

Damage can occur with normal tides and west or northwest winds of 10 to 20 mph.

Similar threats across the Arctic



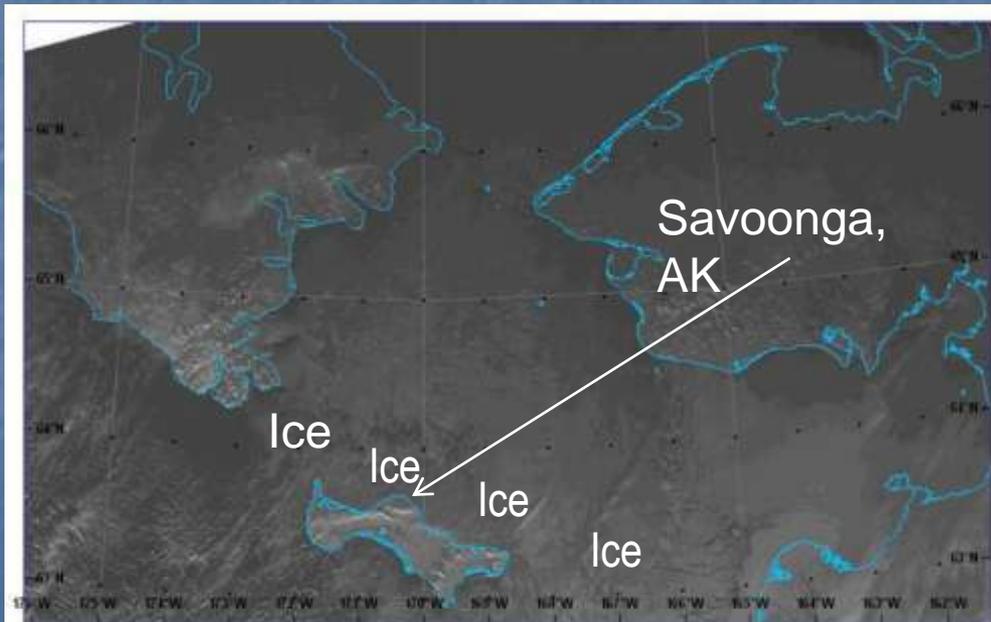
May 31, 2011 - Melting ice on the move from wind & tides



May 30, 2011 - Sea ice damages structures in Kotzebue, AK

Power Outage Savoonga, AK Dec 26 2010 to Jan 3, 2011

- Intermittent power outage for 6 days
- Temperatures ranging from 5F to -10F with 30-50 mph winds
- Nearly $\frac{3}{4}$ of residents lost power
- 25-30 homes experienced bursting pipes and flooding
- At least 20% of the 700 village residents sought refuge in the school (on generator)
- Weather hindered the ability to send in food, plumbing supplies, and repairmen



MODIS AQUA 29 DECEMBER 2010 0005Z

“The extreme cold caused the salt spray to freeze on electrical equipment. Initial outages were caused by line slap from iced-up conductors, but later problems were caused by electrical arcing through conductive salt. We are concluding that the lack of sea ice was a major contributor to this situation.”

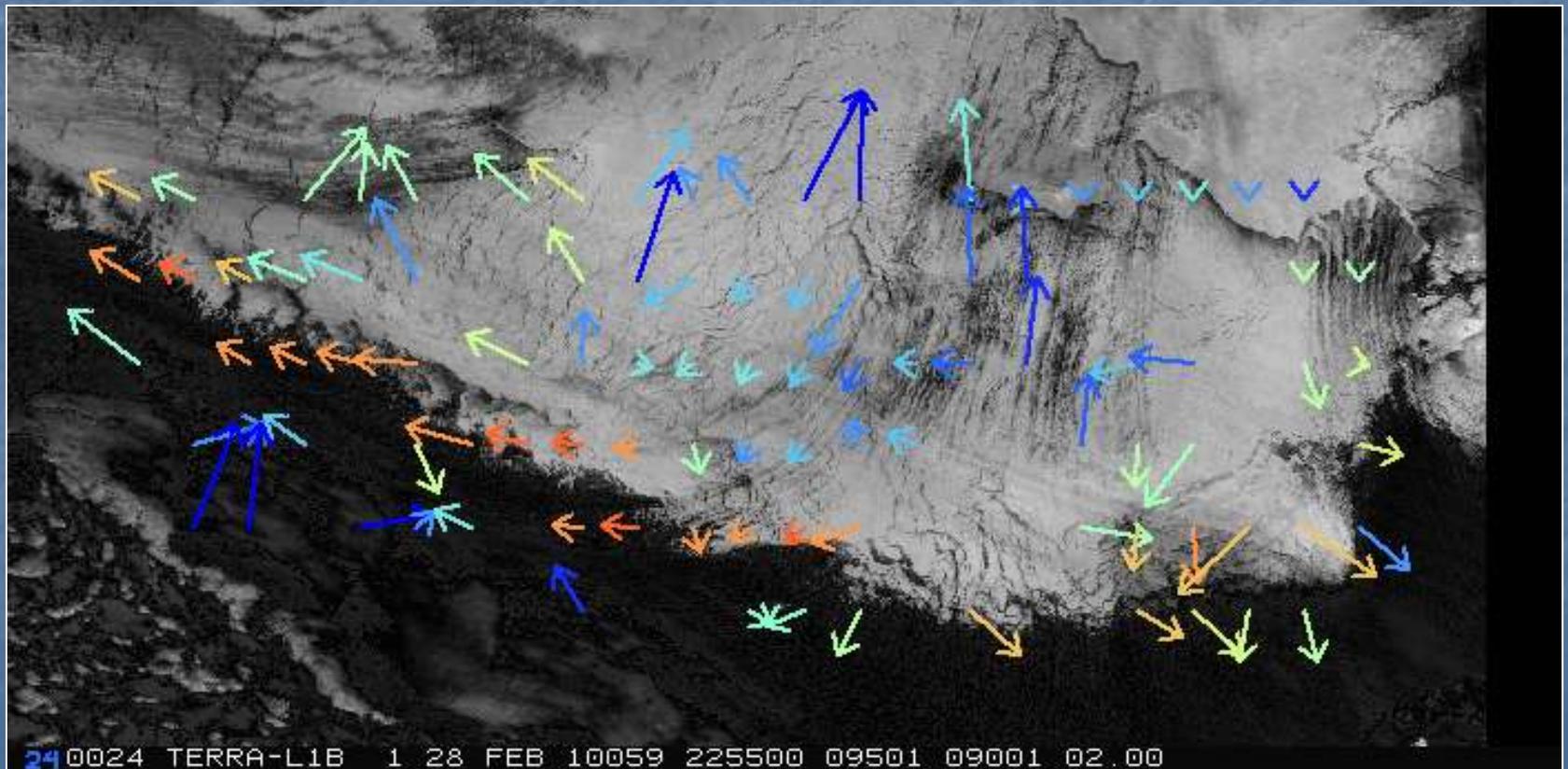
-Meera Kohler, Alaska Village Electric Cooperative

Alaska Sea Ice Program Looking Forward

- Alaska customers have strongly indicated that the current services are insufficient
 - Greater frequency of products and services
 - Higher spatial resolution of products
 - Expanded forecast capabilities
- Additional Sea Ice Forecast Position at Anchorage
- NAIS and common IT platforms and software
- Enhanced partnerships and collaboration with private industry (e.g., Proposed Sea Ice Workshop)
- Arctic Testbed

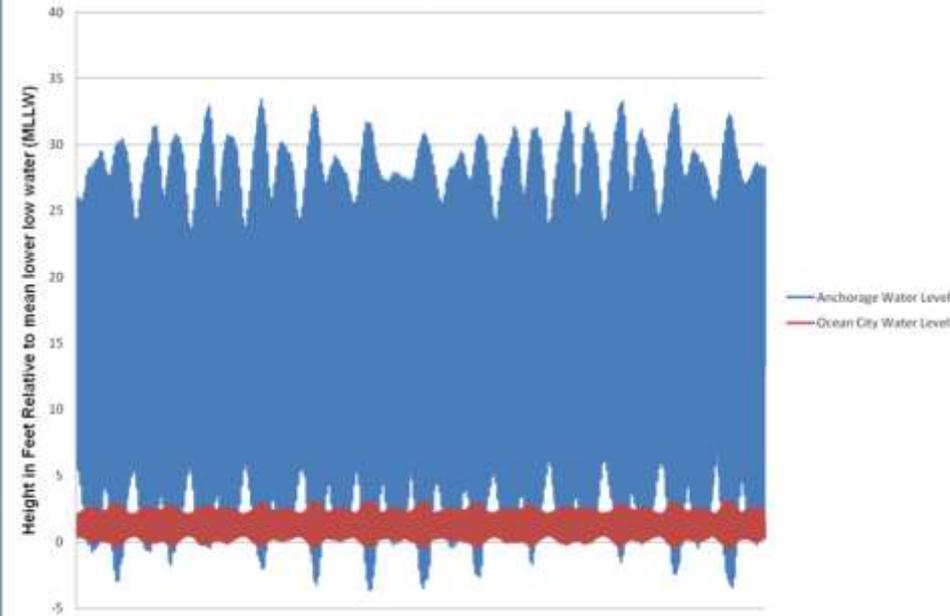
Ice Motion/Vectors

Partnership with NASA's Short-Term Prediction
Research and Transition Center (SPoRT)

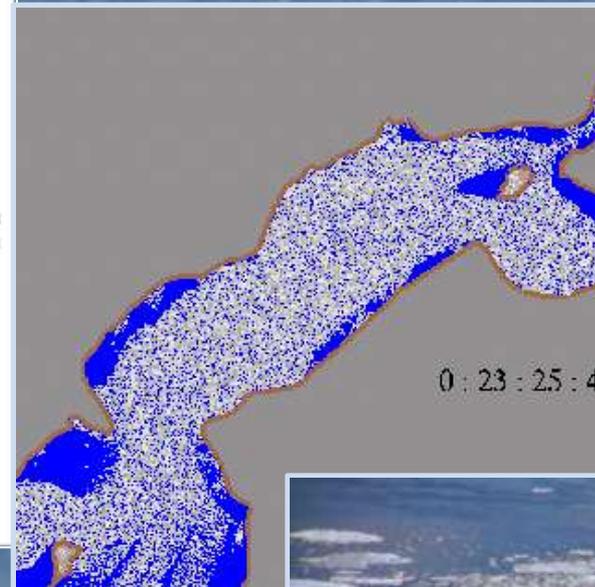


Sea Ice and Tides

Water Level at Anchorage, AK vs Ocean City, MD
Jan 1, 2008 to Jan 1, 2009



Critical to Supply Chain Management
80% of Alaska's supplies ship through Cook Inlet



USACE modeling
Cook Inlet ice
and tides

- Sea ice “sloshes” with extreme tides
- USCG restricts ship traffic when ice velocity \geq 4kt
- T/V Seabulk Pride grounding in 2006
 - Report indicates ice thickness is critical
 - Mooring at Nikiski dock could not withstand ice flow thickness of 4.7” or more



Alaska Sea Ice Program

OAR-NWS AR Testbed

■ Purpose:

- Develop delivery mechanisms to communicate to external stakeholders the current and forecast state of sea ice coverage and weather impact from this phenomena including storm surge, arctic storms, sea ice extent and movement

■ Goals

- Explore application of ensemble of experimental scientific data relevant to decision makers
- Explore data fusion techniques using the High Latitude GOES-R Proving Ground, polar orbiting satellites, external agency (NASA, international) remote sensing imaging
- Explore data base mapping of the science requirements of decision makers
- Explore data mining techniques used for alarm/alert/monitoring functions
- Explore the use of cloud technology to create an integration platform