NOAA's Service Delivery Requirements in the Arctic

NOAA Arctic Science Workshop -- May 2014

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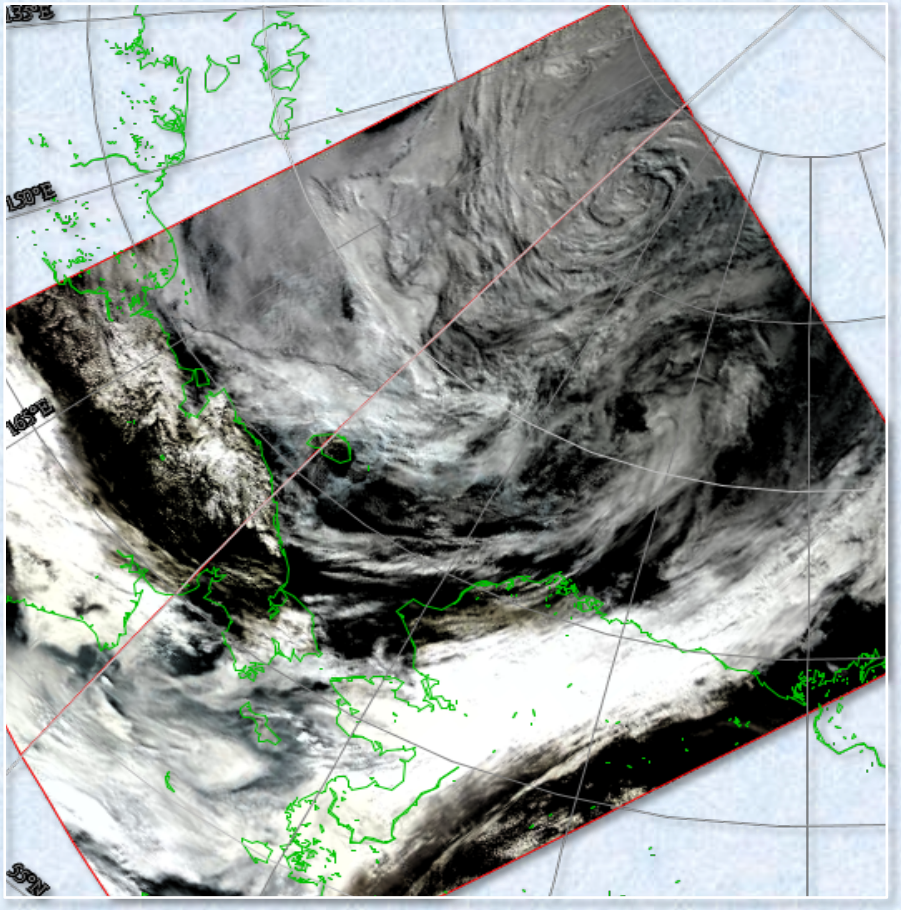
NWS Alaska Region

Outline

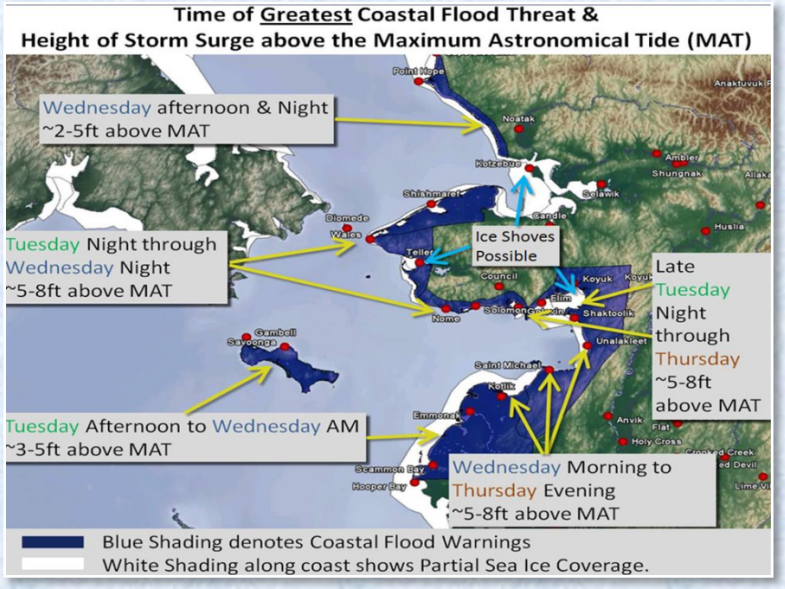
- NWS Services Overview
  - Unique challenges
- Decision Support for Core Partners
- Science and Service Requirements

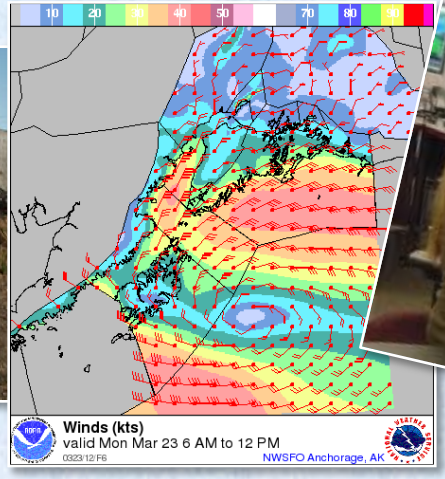


Arctic “Hurricane” August 2012

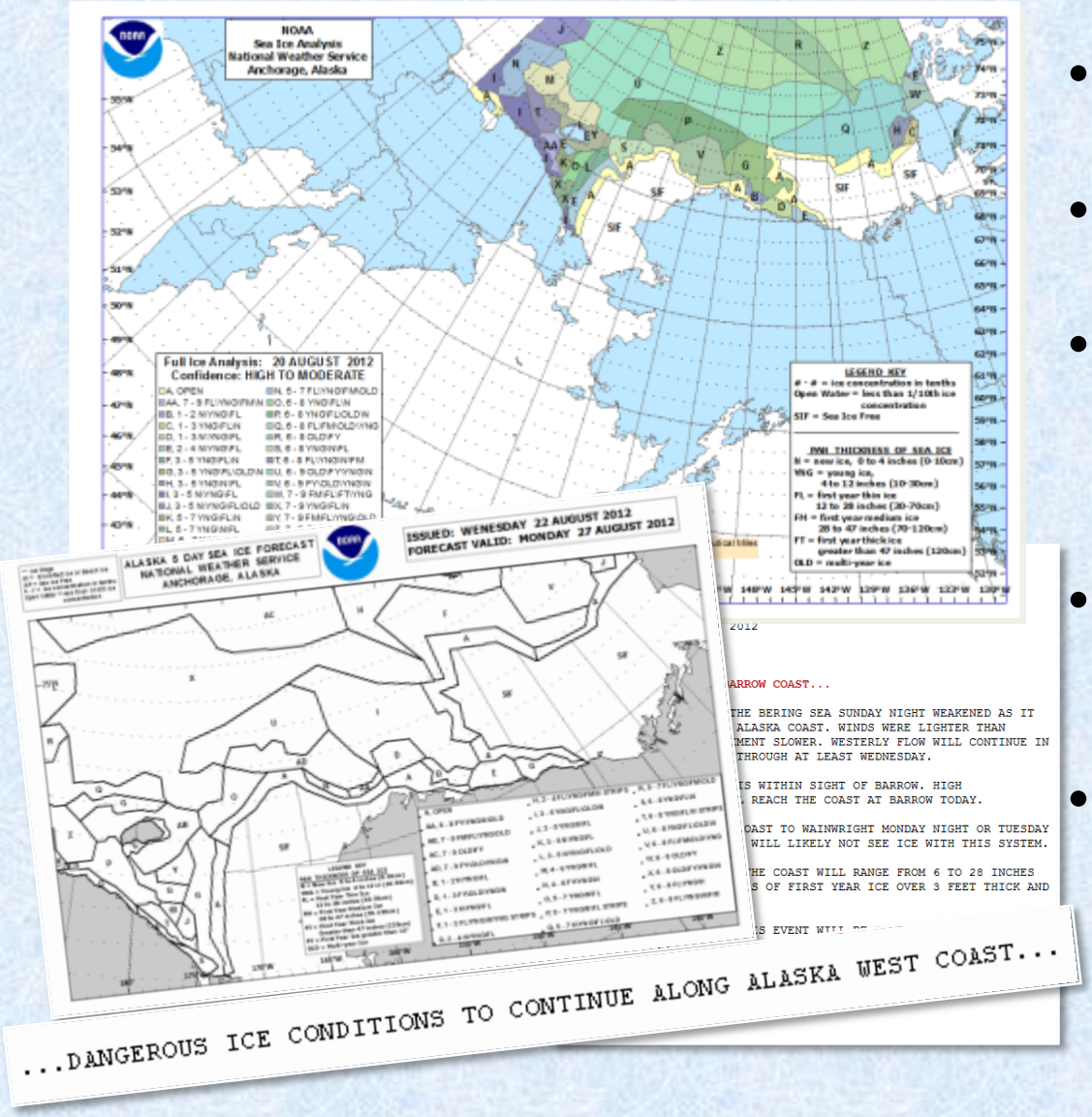
Marine Weather and Coastal Services

- Forecast and warning services for the Arctic, North Pacific, Bering Sea, and Gulf of Alaska waters
- Coastal storm surge forecasts and warnings
- Spot support for HAZMAT and Search and Rescue missions
- Direct contact with mariners for delivery of critical information and collection of volunteer observations





Sea Ice Services



- Sea ice analysis and forecasts ***focused*** on Alaska waters
- High resolution, local scale for tactical decisions
- Delivery meets user requirements
  - GIS enabled
  - Low-bandwidth for MarineFax
- Fully integrate ***sea ice*** and ***weather*** into coastal and marine services
- Stakeholders: subsistence hunters to ice breakers to fishing fleet

Major Partners and Stakeholders

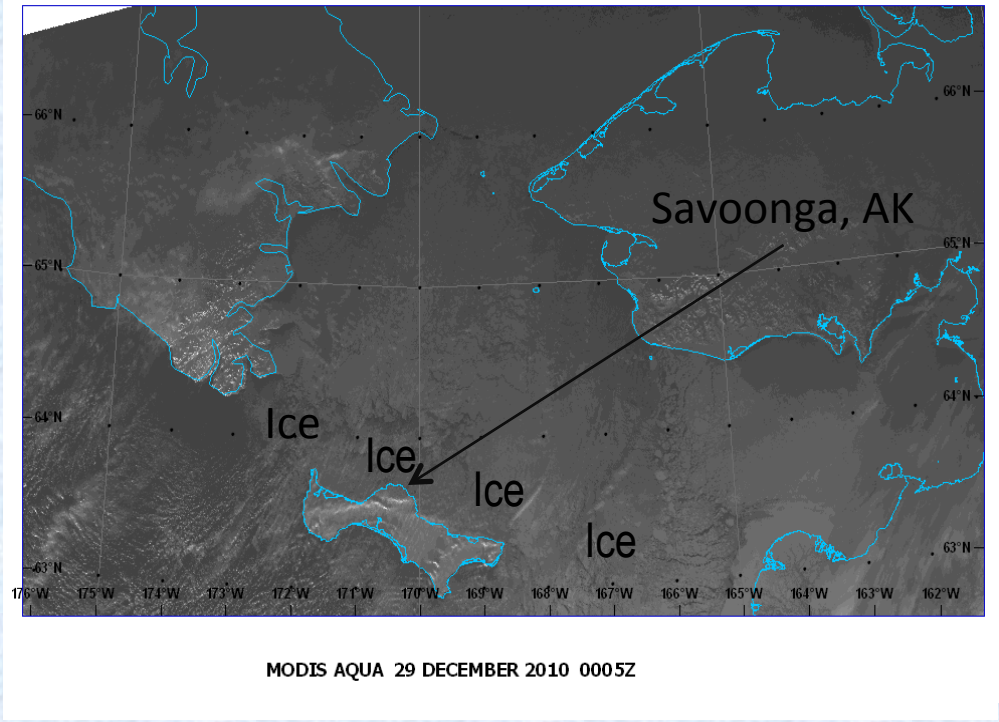
Challenges: Fall Storms

Kotlik, November 2013

Challenges: Open Water

Savoonga, January 2011

- Intermittent power outage for 6 days
- Temperatures ranging from 5F to -10F with 30-50 mph winds
- Nearly ¾ 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



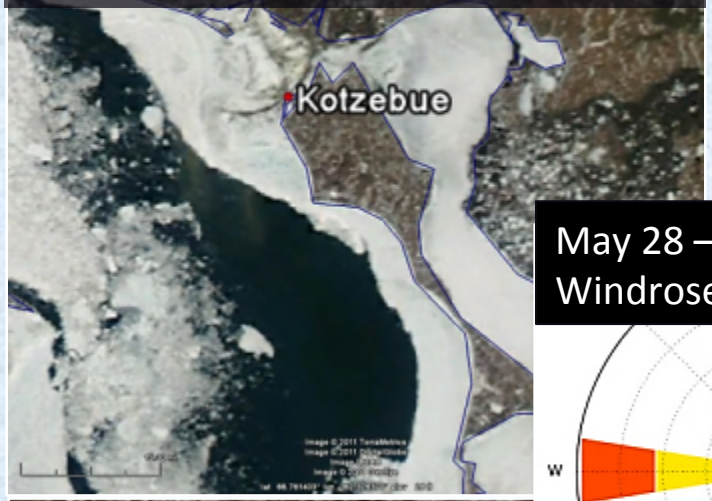
"The **extreme cold caused the salt spray to freeze on electrical equipment**. Initial outages were caused by line slap from iced-up conductors, but later problems were caused by electrical arcing through conductive salt. We are concluding that the **lack of sea ice was a major contributor to this situation**."

-Meera Kohler, Alaska Village Electric Cooperative

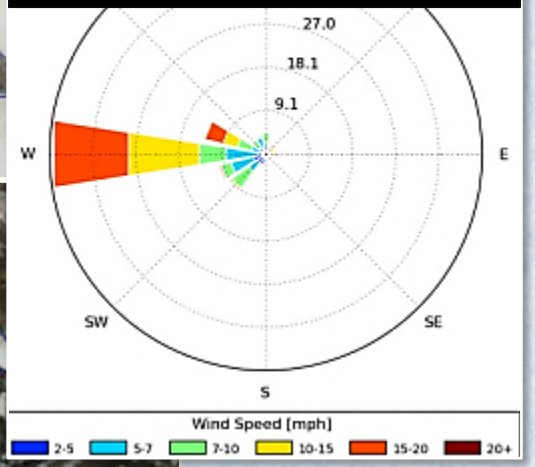
Challenges: Break up/Melt out

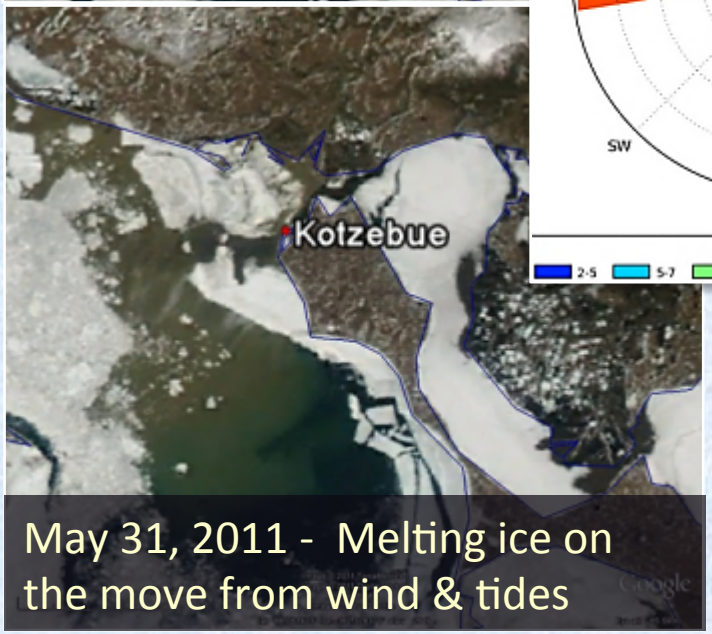
Kotzebue, May 2011

May 27, 2011 - Shorefast locked in place



May 28 – Jun 2, 2011
Windrose Kotzebue, AK





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

Ice break up in Kotzebue can turn damaging when winds combined with high tide push ice onshore.

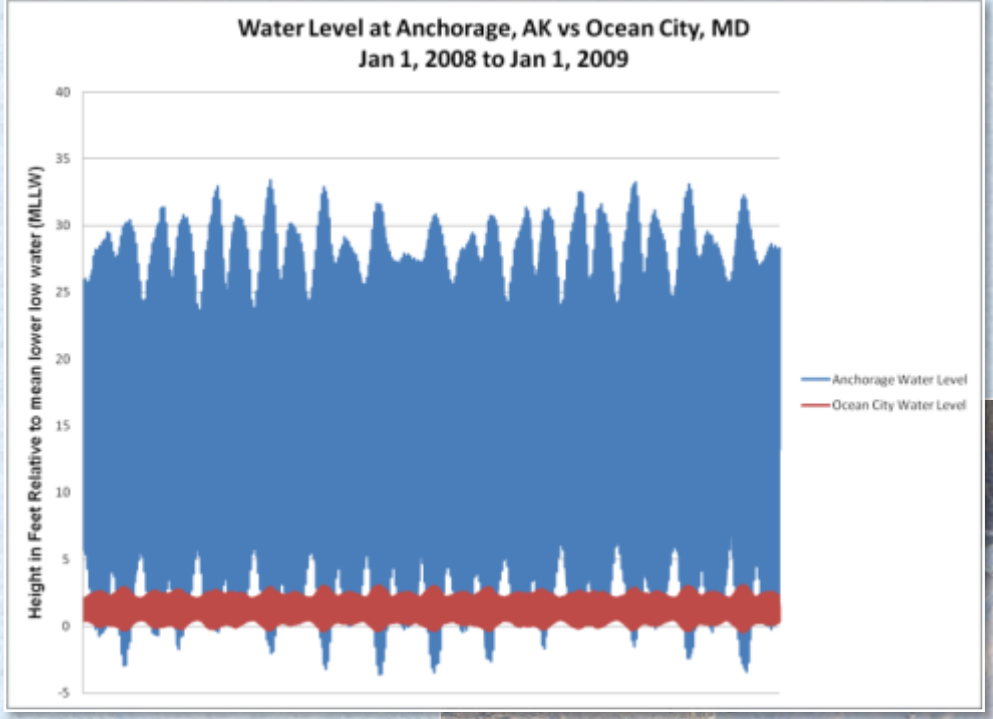
Damage can occur with normal tides and west or northwest winds of 10 to 20 mph.

Similar threats across the Arctic.

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

Challenges: Sea Ice and Tides

Cook Inlet near Anchorage



Ship loose from mooring in Cook Inlet due to tide and ice interaction

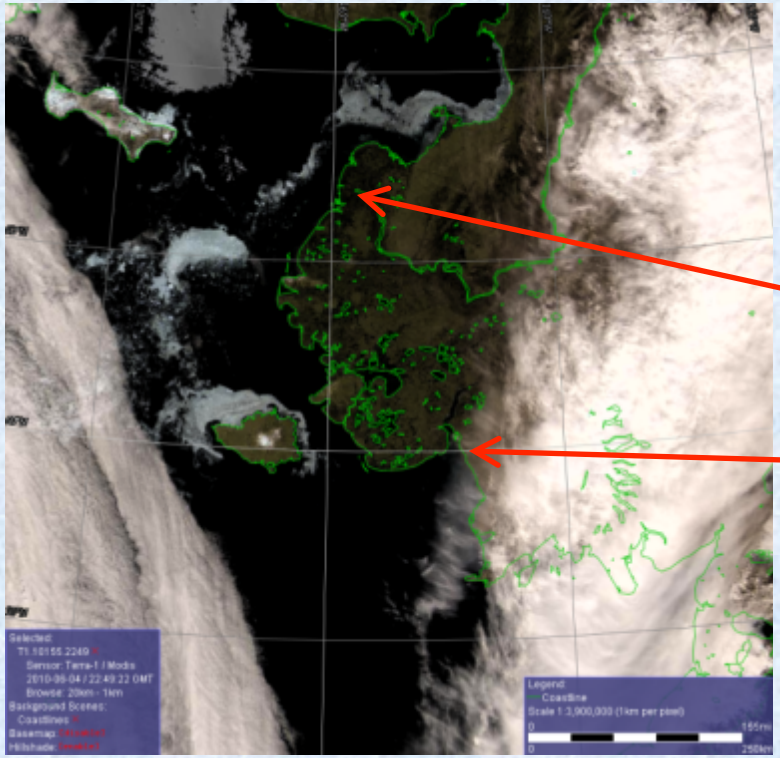
Decision Support Services: In Alaska and in the Arctic

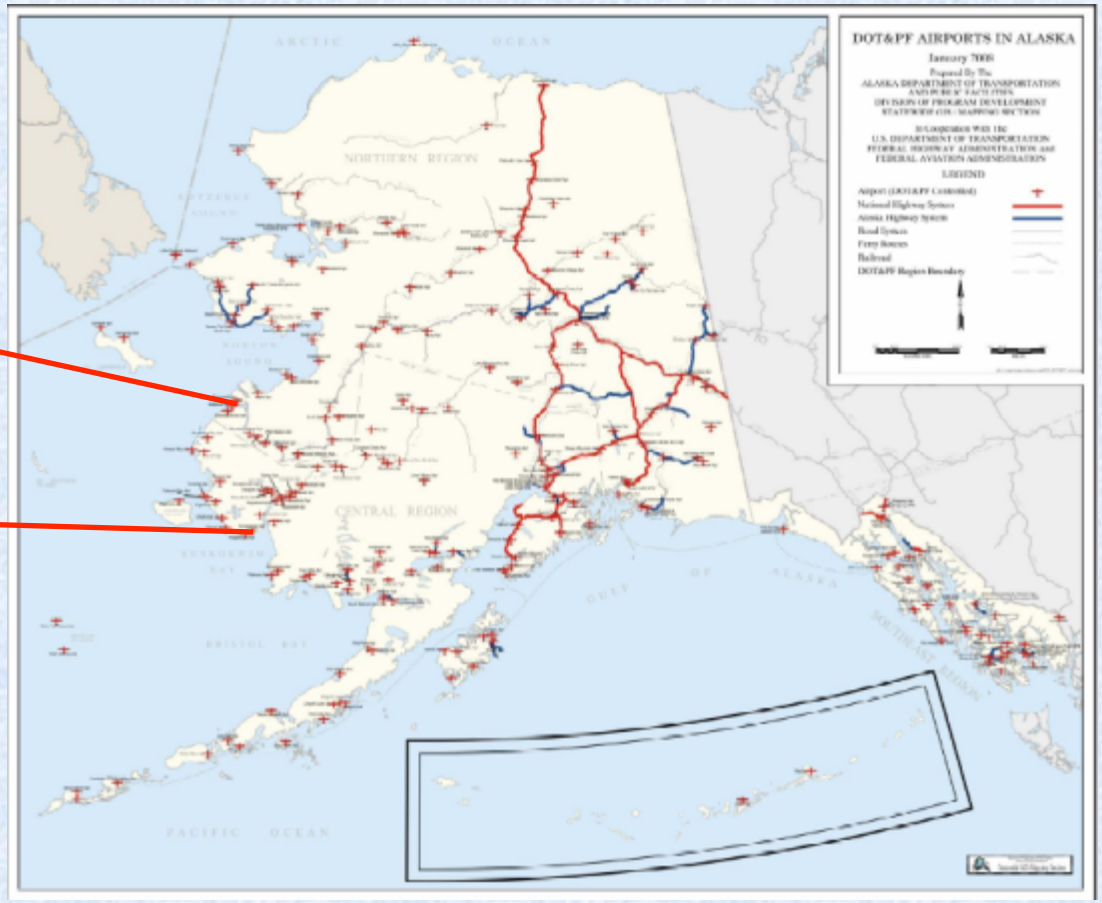
Crab Boats being led into Saint Paul Harbor February 2013

Decision Support Services: U.S. Coast Guard

NWS provided 24-hour support to the USCG Ice Breaker Healy during its escort of the tanker Renda for an emergency fuel delivery December 2011 to January 2012

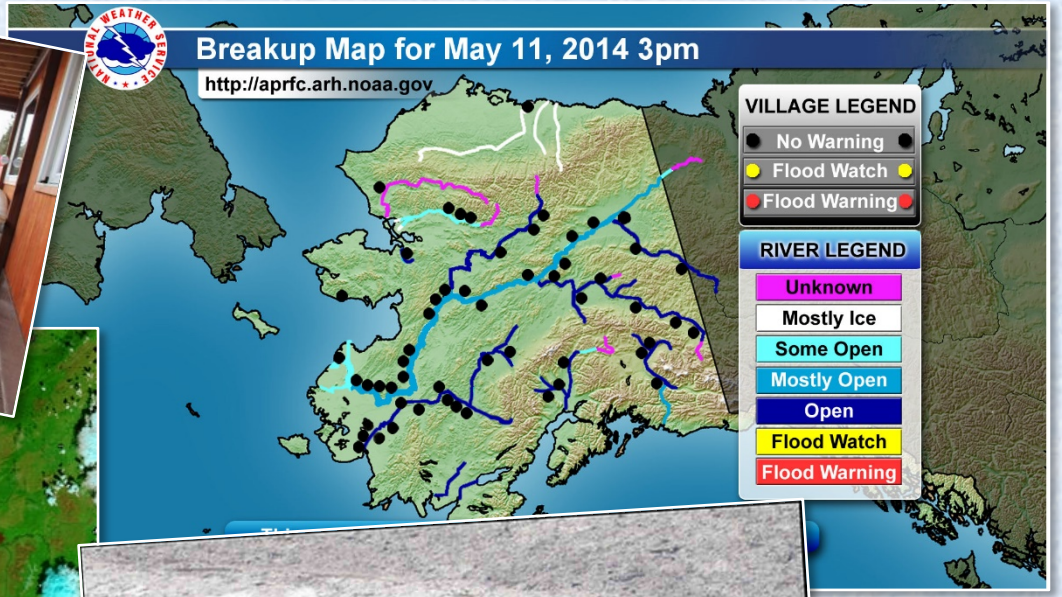
Decision Support Services: Supply Chain Management

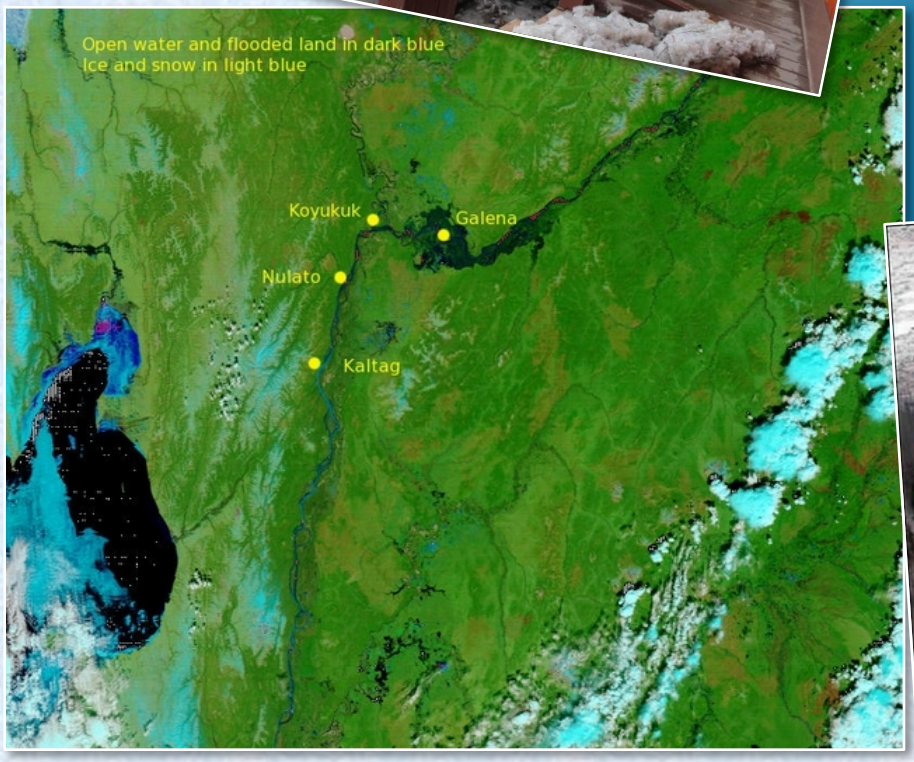




Fuel and food for rural Alaska

Decision Support Services: River Break Up





Decision Support Services: Bureau of Ocean Energy Management

- Coordinated NOAA Sea Ice Outlook provided in early September.
- Routine briefings provided to help BOEM and BSEE with situational awareness of weather and sea ice conditions in the Chukchi and Beaufort Seas through the fall season.

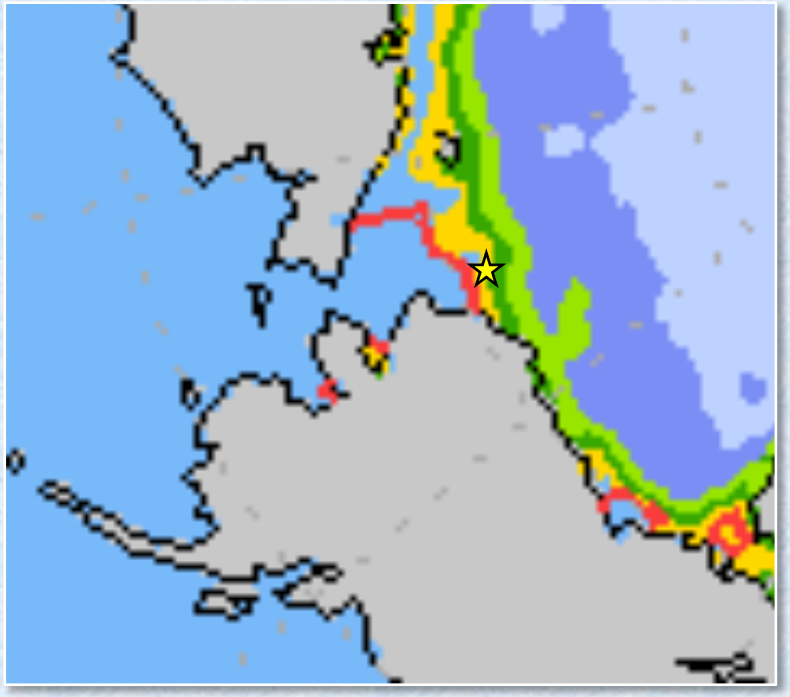
Derived from NIC Sea Ice Analysis

Ice Extent October 30st

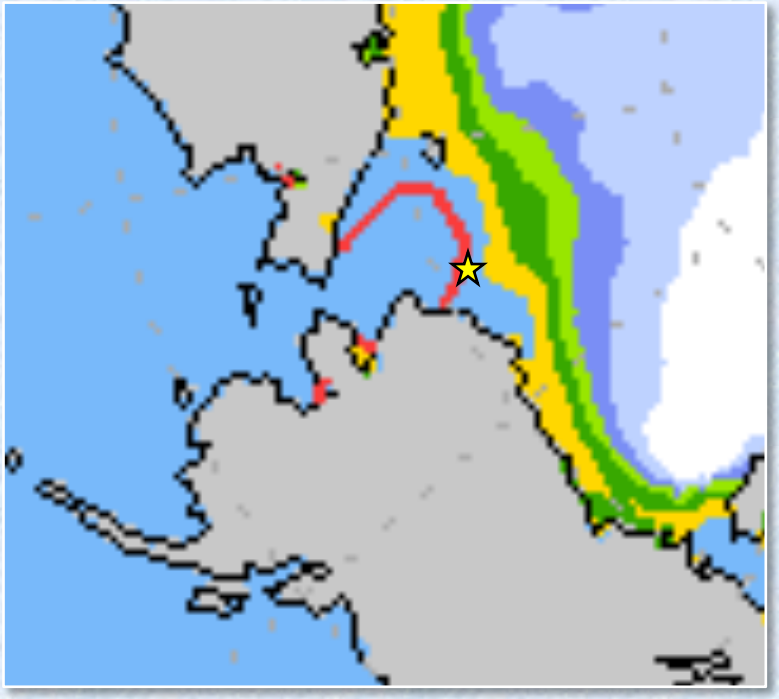
Ice Extent November 1st

Future DSS Support for BOEM: The length of the open water season

- The most critical information for operations planning in the Arctic is the length of the open water season.
- Some years may have too short of an open water season to expend resources, others may have long open water season to maximize resources spent.



July 2013



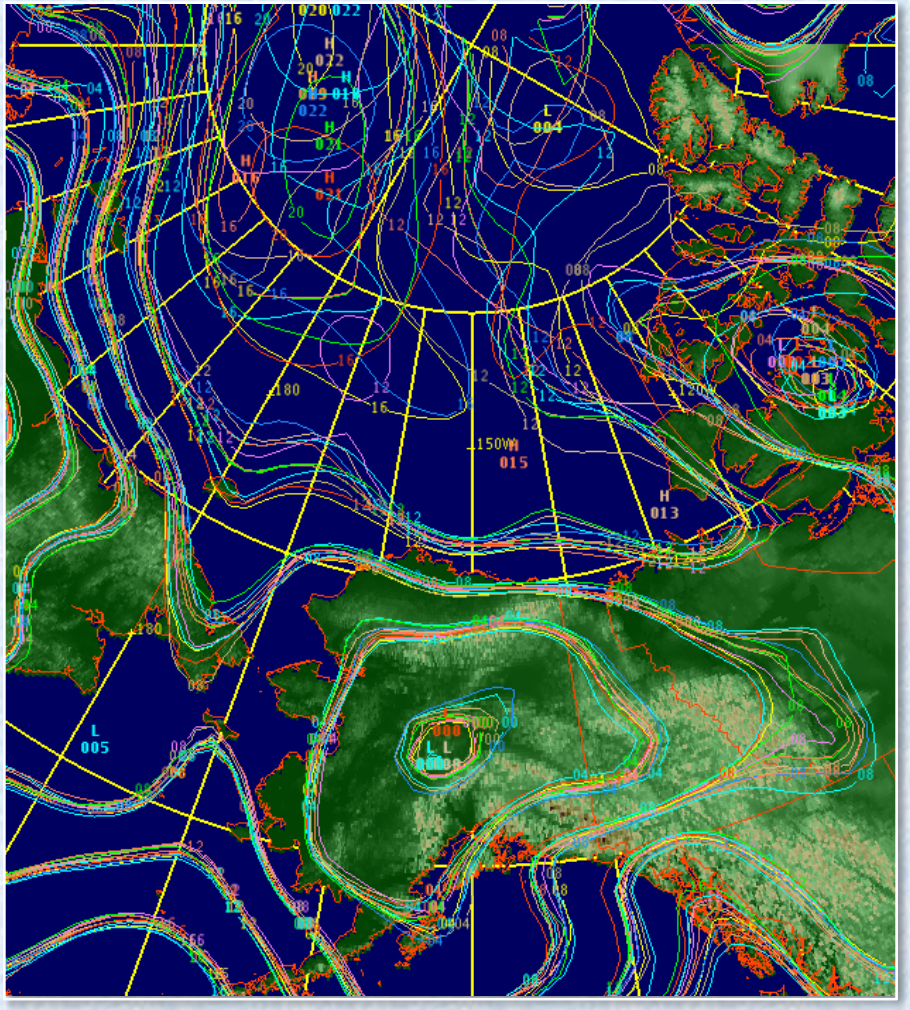
October 2013

Mean Monthly Sea Ice Concentration
(NCEP Climate Prediction Center's CFS Model)

Science and Service Requirements

Short-Term Weather and Ice

- Current forecast skill is lower in the Arctic then at lower latitudes.
- At these shorter time scales, scientific understanding and models need to be adequate to capture the fine detail interactions between the ice, ocean, and atmosphere.
- Coupled atmosphere, ocean, and ice models are needed to accurately represent these details.



Comparison of multiple weather model sea level pressure initializations over the Arctic

Science and Service Requirements

Weather to Climate Scale

- Need understanding of antecedent conditions, which set the stage for ice melt out and freeze up.
- Week 2 – Week 6 forecasts are critical to determine feasibility of maintaining operations or the ability to respond to an event due to lack of infrastructure nearby.
- *Multi-billion dollar decisions are made 6 – 8 months before activity begins.*
- <u>Probabilistic forecasts are vital for risk management.</u>

NOAA Arctic Test Bed

Objective: Develop useful products and delivery mechanisms to communicate current and forecast weather, climate and sea ice information with associated marine and coastal impacts including surge, inundation, and Arctic storms to enhance decision making among Arctic customers and stakeholders.

Benefits

- Address national (multi-agency) and NOAA goals in the Arctic
- Partner with, and leverage ongoing NESDIS Satellite Proving Ground activities as well as other NOAA Test Beds and Proving Grounds
- Formalize collaboration and coordination with other federal agencies with similar goals (e.g., BOEM, USACE, USGS, DOE, USCG , FAA) as well as other NOAA line offices
- Provide direct and meaningful partnership with stakeholders such as the Alaska native communities and tribal councils
- Provide input to science-based decision-making and adaptive planning guided by ongoing research and monitoring

Thanks for your interest!

Questions?