

NOAA's Requirement for an Arctic Testbed

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NOAA / NWS Arctic Test Bed

The United States is an Arctic nation, one of only eight such nations worldwide that are responsible for the stewardship of a region undergoing dramatic environmental, social, and economic changes.

Report to the president



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Objectives

- Operational and research goals and requirements
 - *The R2O-O2R process would be cohesive, include adequate resourcing not only in research activities, but also define the steps needed to transition research results into the operational environment*
- Test Beds allow for quick implementation of new products, services, and research where those closest to the customer needs have the best opportunity to discover requirements that enhance the customers' decision making process.

Initial Partnerships – NOAA Oceanic & Atmospheric Research (OAR), NOAA NESDIS, University of Alaska Fairbanks, NOAA NWS Climate Prediction Center, MSC Canadian Ice Services, US Bureau of Ocean Energy Management



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Forecast Challenges

Current Science & Technology Gaps

- Scarce Arctic in-situ observation network
 - wave - ocean - ice buoys / weather & river observation platforms
- NWP Performance: CONUS vs. OCONUS
- Sea Ice Modeling capabilities far from mature
- Weather, water, ocean, wave and sea ice forecasting continue to be incredibly challenging



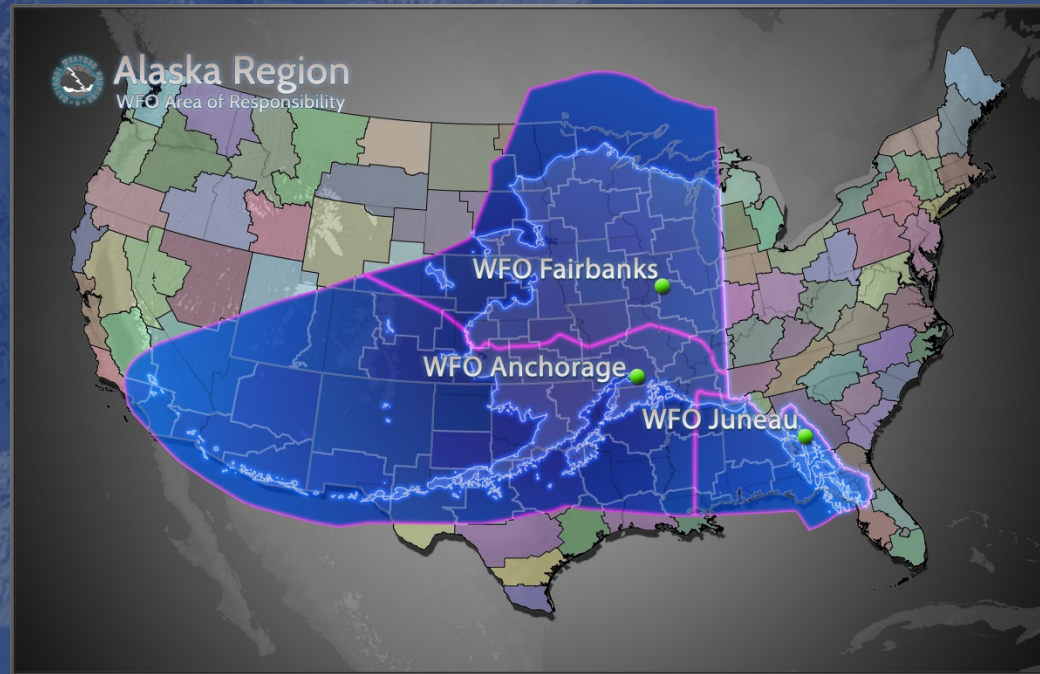
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- NWS Alaska faces many unique challenges

Changing Sea Ice :

Emerging Customer Requirements

- Regulatory
- Emergency Response
- Supply Chain Management
- Resource Extraction
- Transportation
- Ecological





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Service Challenges

- Sea Ice Guidance
 - *Daily/Seasonal/Interannual*
- Coastal Storms
 - *Inundation / Erosion*
- Influences
 - *River Outflow & Sea Ice*
- Volcanic Ash
- Aviation Flight Safety
 - *Arctic Stratus & Icing*
- Supply Chain Impacts
- Waves in Sea ice
- Wildfire Smoke Guidance
- Atmospheric River Flood Events
- General Forecast Processes
- Climate Change Impacts
 - Adaptability
 - To What?!

Societal Changes — How to communicate all of the above?



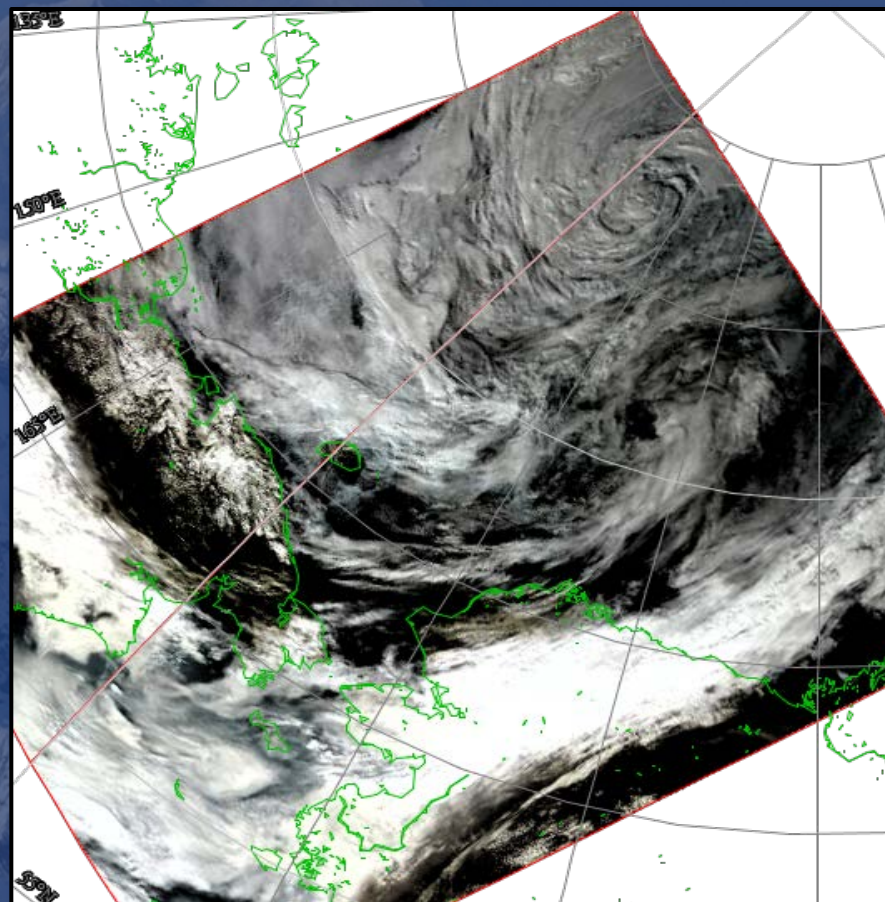
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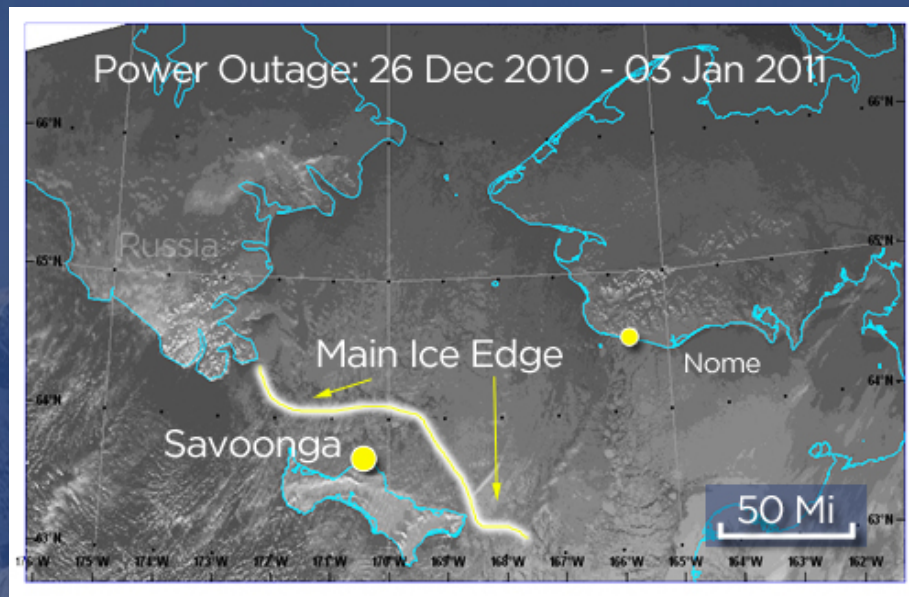
Forecast Challenges:

August 2012

Arctic Summer 'Hurricane'

- One of the strongest summer storms to have affected the Arctic Ocean in recent decades occurred in early August.
- The storm's central pressure was comparable to a Category-1 hurricane.
- The storm dispersed an already sparse ice cover, and waves from the storm propagated through the open water to the northern Alaskan coast, producing flooding in many villages.
- Destroyed over 1M km² sea ice in less than one week..
- Contributed to the lowest minimal warm season Arctic sea ice coverage in the satellite era.





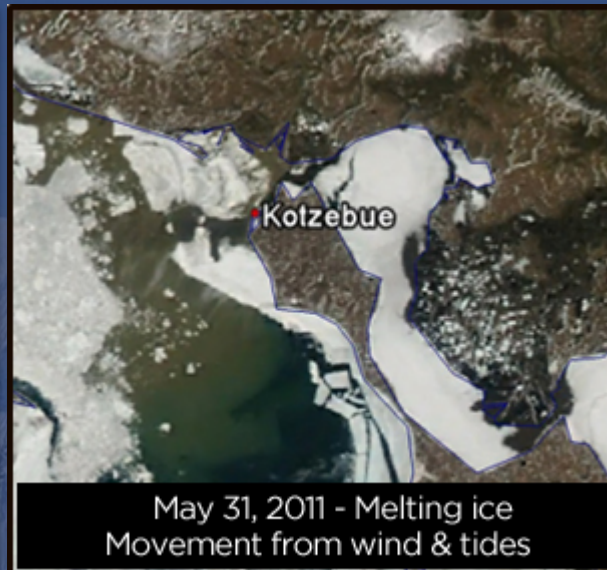
- Intermittent power outage for 6 days – $\frac{3}{4}$ of village w/o power
- Temperatures ranging from 5° F to -10° F with 30-50 mph winds
- 25-30 homes (20% of village) experienced bursting pipes and flooding
- At least 20% of the 700 village residents sought refuge in the school (on generator)
- Weather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



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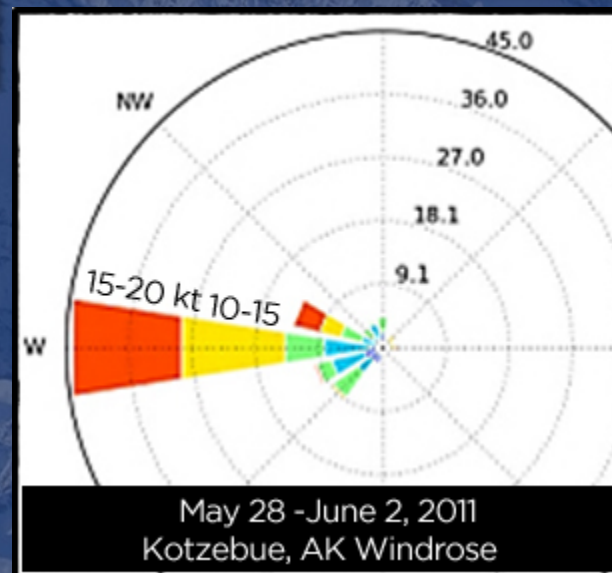
Forecast Challenges:

Sea Ice



Ice Breakup in Kotzebue – May 2011

- Damaging when winds combine with high tide push
- Damage possible with normal tide and W or NW winds of 10-20 MPH
- Similar threats across the Arctic

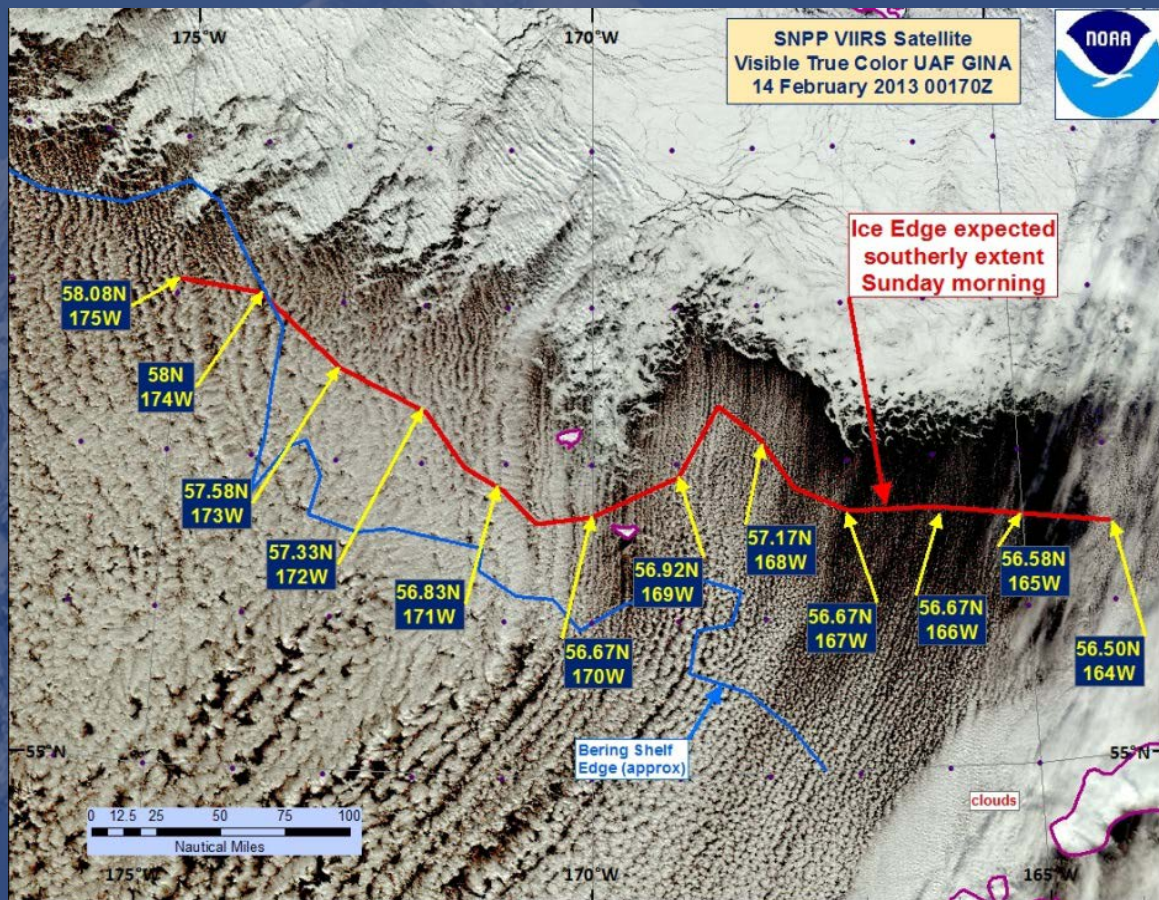




Freezing Spray, accumulated beyond the ice edge



Fishing for Ophelia Crab in the Bering Sea

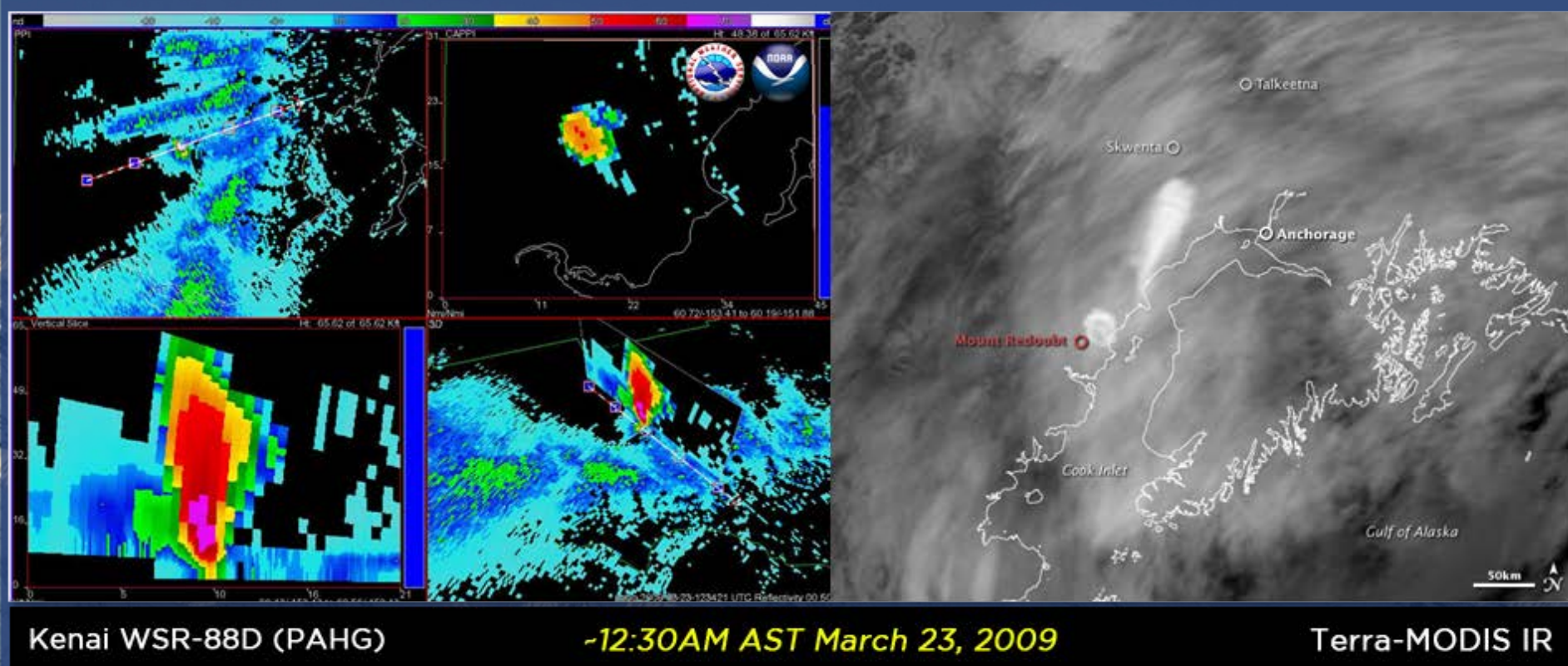




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Forecast Challenges:

Volcanic Ash



Kenai WSR-88D (PAHG)

-12:30AM AST March 23, 2009

Terra-MODIS IR

Mt. Redoubt – March 2009



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Forecast Challenges:

Arctic DSS

September 2012

Popcorn #1
Crackerjack #1
Diamond #1
Klondike #1
Burger #1

Chukchi Sea

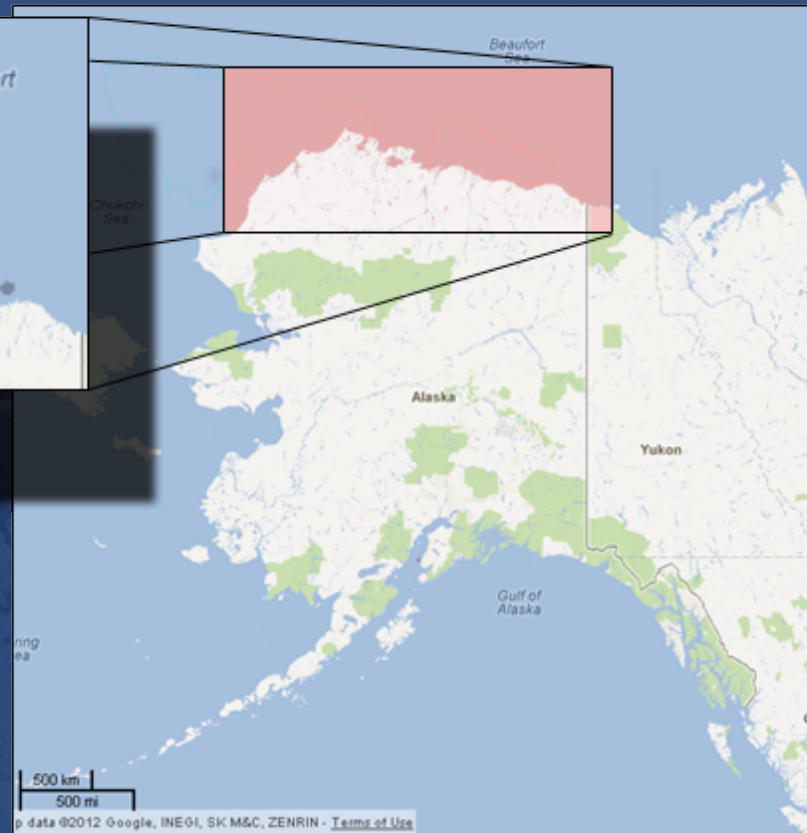
Beaufort Sea

Department of the Interior (DOI)

Bureau of Energy Management (BOEM)

Request of NOAA Support:

- Provide best freeze up forecast at Burger Site
- Provide weekly update to the initial ice forecast
- Provide weekly updates to weather conditions of significance to operations





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Forecast Challenges:

Arctic Marine Transport





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Project Activity

Action:

- Formulate a Test Bed plan to improve Marine, Weather, Climate and Sea Ice forecasting decision support capability to meet current and emerging needs in the Arctic

(Initial) Focus:

- Sea ice forecast capability is critical

Deliverables:

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



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Benefits

- Address national, NOAA and NWS goals in the Arctic
- Provide input to Arctic Report Card
- Partner with, and leverage ongoing NESDIS Satellite High Latitude 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



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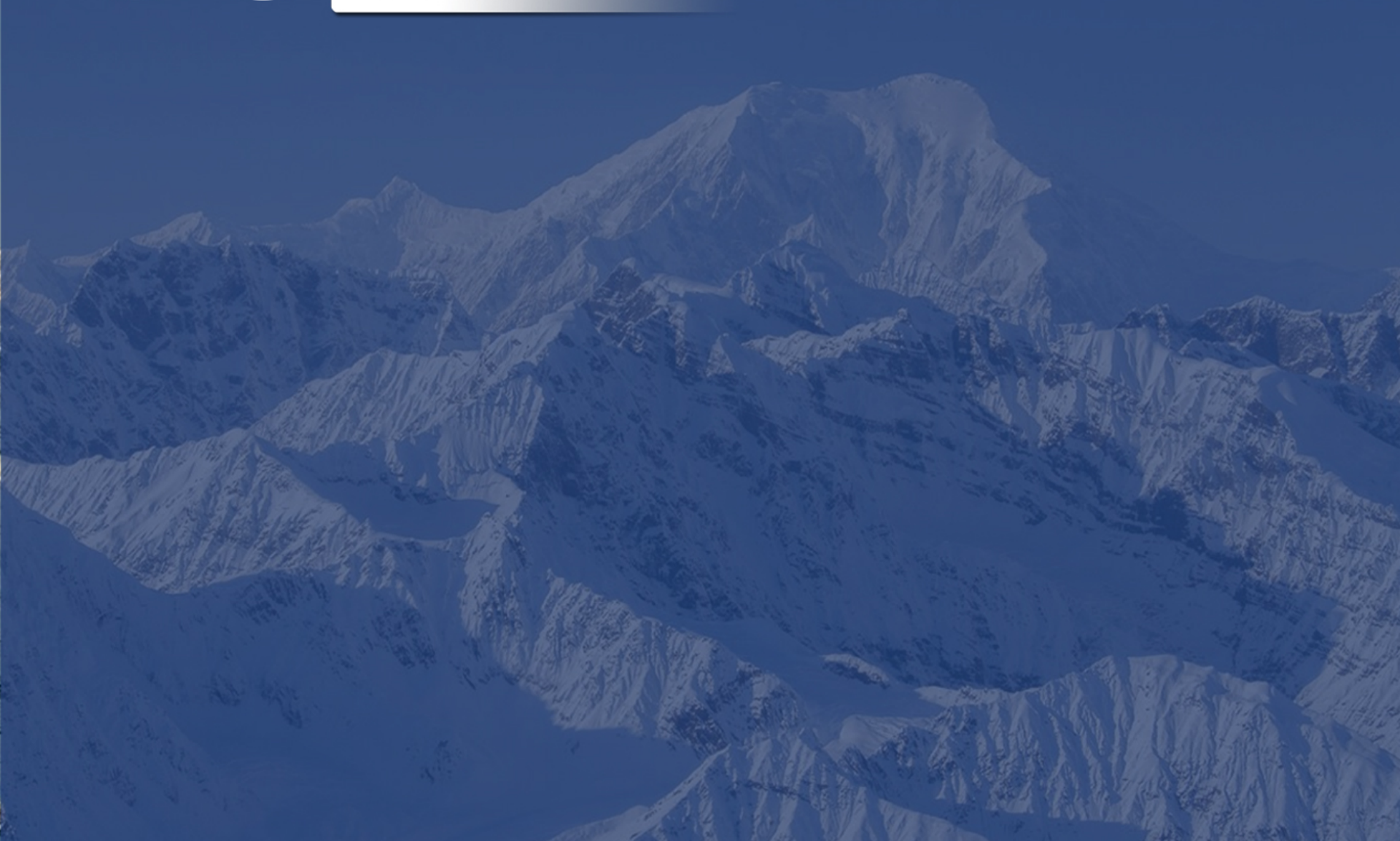
- Questions?





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Additional Slide





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Test Bed Specifics

- WFO Anchorage co-location
- Filling positions FY15/FY16
 - Director
 - 2 Research Meteorologists
 - 2 Science Developers
 - NWS Forecasters to periodically rotate through
 - Visiting Scientist Opportunities
- Capabilities:
 - Integration with NWS forecast systems and data streams
 - Integration with research data streams
 - Potential secondary capability at University of Alaska at Fairbanks

