



Research in Support of Arctic Naval Operations



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ONR Arctic Research – Past and Present



- **Prior to 1993**
 - Robust research program (about \$15M/year 6.1; >\$30M/yr 6.2)
 - Aggressive field studies - ice acoustics; lead structure; sea ice EM scattering
- **1993-present**
 - Cold war ends, Arctic declines as a Naval priority, formal Arctic research program ends in 2003.
 - Small ONR program (about \$ 1M/year) toward improved Arctic system modeling, Beaufort Sea ocean observations, impacts of warming on shoreline retreat.
- **Areas of Interest**
 - Address changes affecting Navy strategic investments
 - Assure tactical competence as the Arctic evolves
 - Hardened technology for year-round Arctic observations
- **Working with Oceanographer of the Navy – future direction**



Despite shifts in Navy priorities - the scientists trained , the observational technology developed, and the data collected formed critical basis for recognizing Arctic change.



National Oceanographic Partnership Program (NOPP)

- Collaboration of federal agencies to provide leadership and coordination of national oceanographic research and education initiatives.
- Facilitates interactions among federal agencies, academia and industry
- Increases visibility for ocean issues on the national agenda
- Achieves a higher level of coordinated effort across the broad oceanographic community

- 1) ***Achieve and sustain an Integrated Ocean Observing System (IOOS);***
- 2) ***Promote lifelong ocean education;***
- 3) ***Modernize ocean infrastructure and enhance technology development; and***
- 4) ***Foster interagency partnerships to increase and apply scientific knowledge.***





Ongoing Arctic Efforts

- **Circulation, Cross-Shelf Exchange, Sea Ice, and Marine Mammal Habitats on the Alaska Beaufort Sea Shelf**

Thomas Weingartner
Institute of Marine Science
University of Alaska, Fairbanks, AK

Ron Kwok and Ben Holt
NASA Jet Propulsion Laboratory
Pasadena, CA

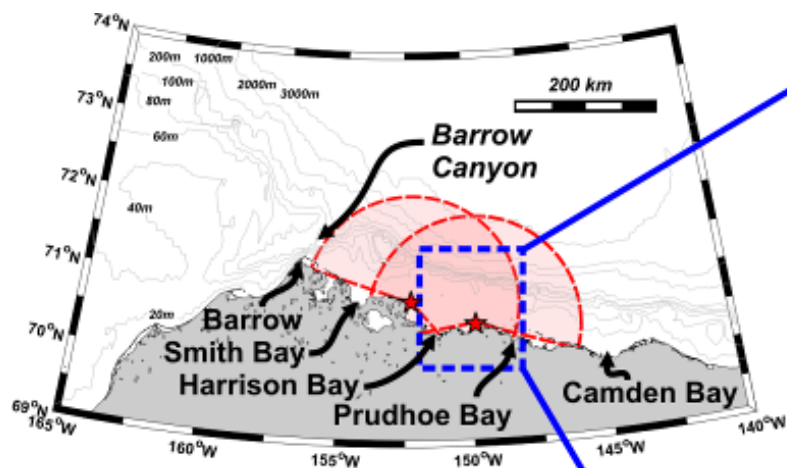
Robert Pickart and Al Plueddemann
Woods Hole Oceanographic Institution
Woods Hole, MA

Susan Moore and Kate Stafford
Applied Physics Lab
University of Washington
Seattle WA

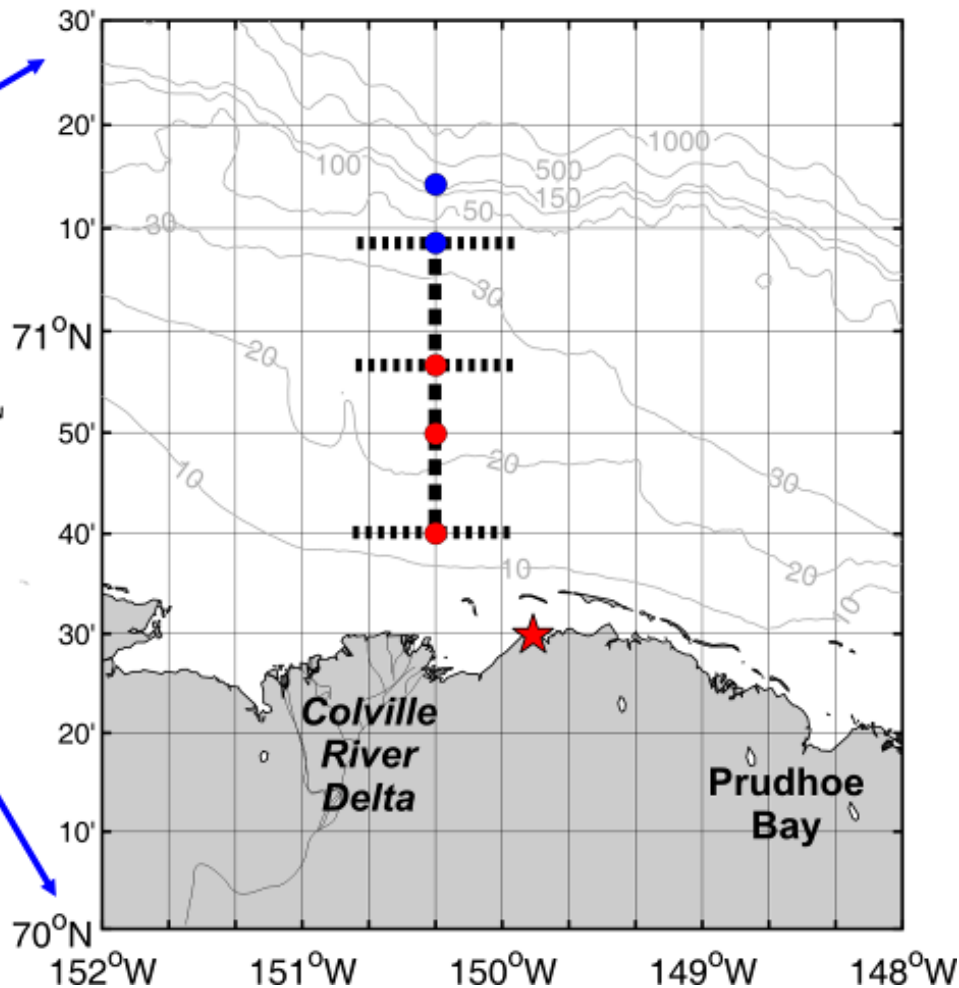




Weingartner et al., NOPP



- ★ HF Radar Station
- Nearshore Mooring
- Mooring with Profiler
- 50 km AUV Transect
- 30 km AUV Transect



RADM Nevin Carr, Chief of Naval Research, and RDML David Titley, Oceanographer of the Navy, will visit USCGC Healy in the Beaufort Sea in July 2009



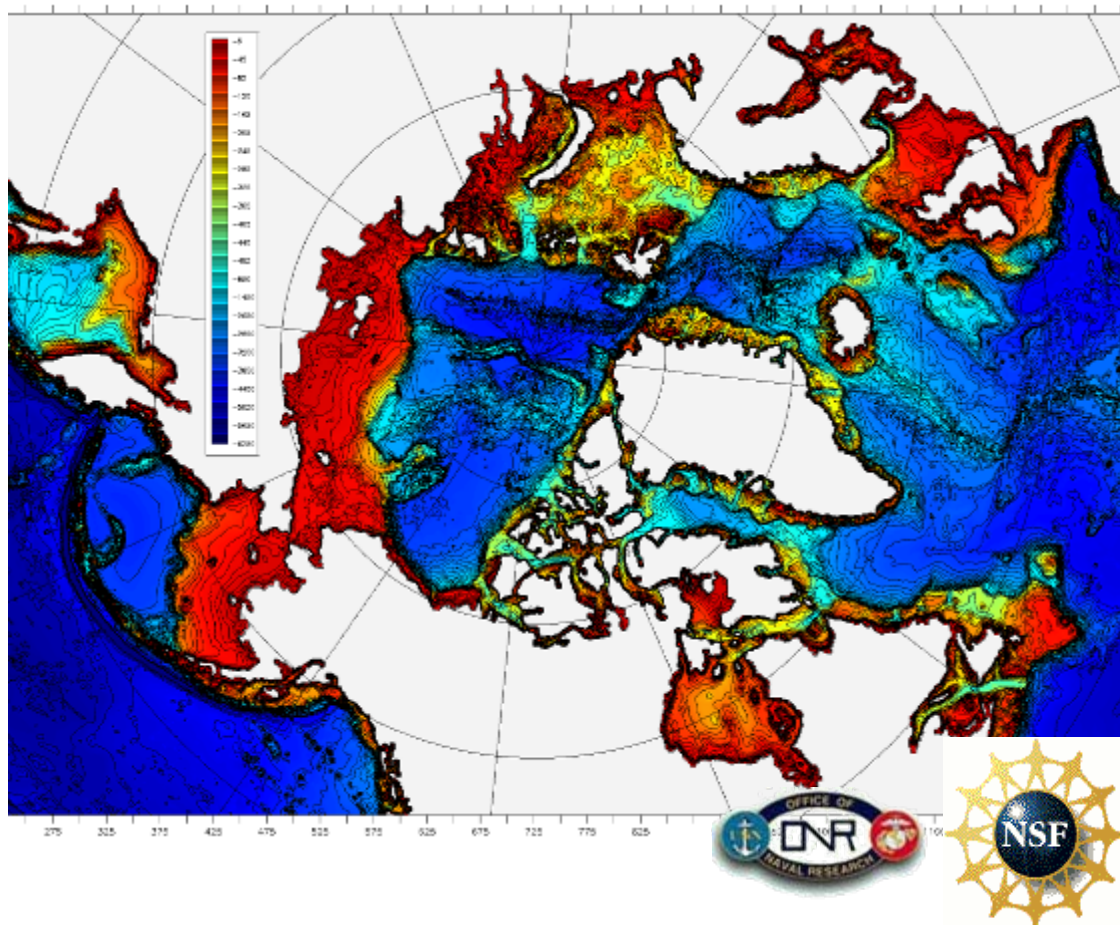
Ongoing Arctic Efforts

A comprehensive modeling approach towards understanding and prediction of the Alaskan coastal system response to changes in an ice-diminished Arctic

**Wieslaw Maslowski
Naval Postgraduate
School, Monterey, CA**

**John Cassano
University of Colorado,
Boulder, CO**

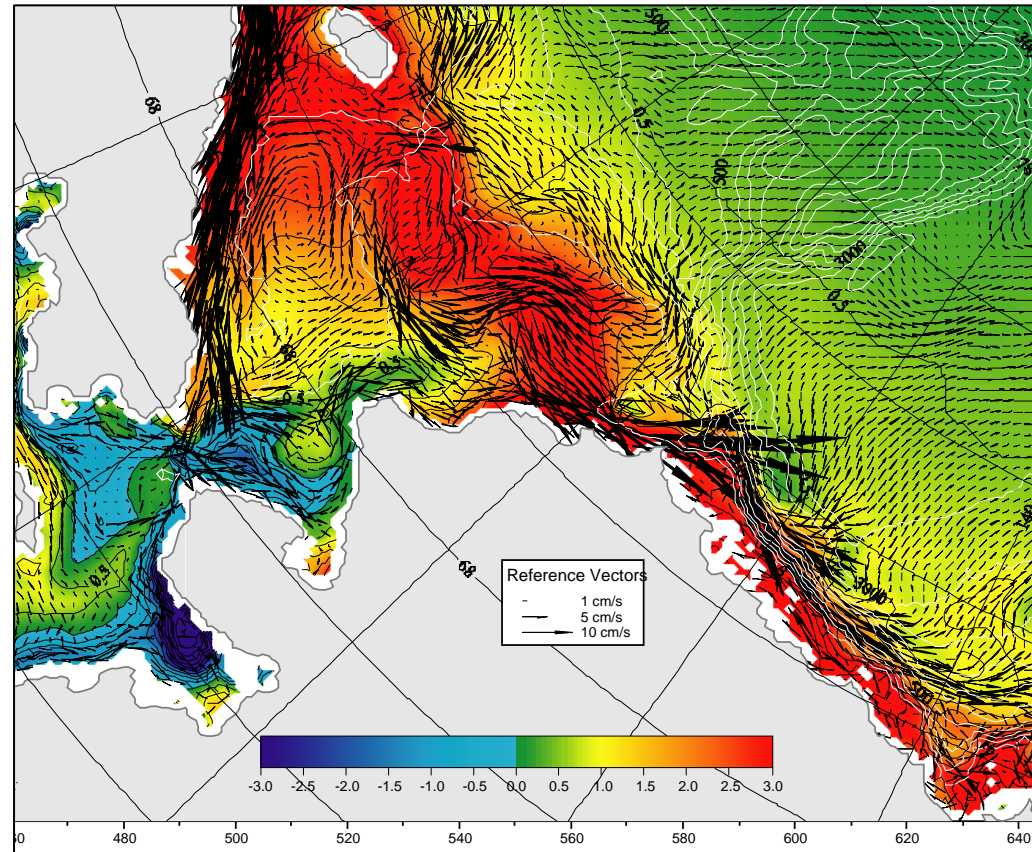
**John J. Walsh
University of South Florida,
St Petersburg, FL**





Maslowski et al., NOPP

- Explore sea ice, ocean and atmosphere feedback processes
- Quantify impacts of oceanic and atmospheric forcing on regional sea ice variability
- Determine effects of changing sea ice, ocean and atmospheric dynamics on the Alaskan coastal ecosystem
- Establish numerical requirements for optimal hindcast and prediction of Alaskan coastal system environmental conditions



September 2002 temperature ($^{\circ}\text{C}$) and velocity anomalies (cm/s) at depth 5-10 m

Coupled high resolution atmosphere (Polar WRF), ocean (POP), ice modeling (LANL/CICE)



Operational Navy Efforts

- National Ice Center
 - Interagency Ice Expertise
 - Continuing support to National and International interests at the poles
 - USN, USCG, CIS
- Arctic Submarine Lab
 - Submarine Force Arctic issues
 - Spring 2009 Ice Camp
 - ONR sponsored
 - SSXCTD Testing
 - Ocean pH Measurements





Harsh under 'normal' conditions

15 May 09 CNO BRIEFING COVERED

What We Know:

- Environment, Resources, Bathymetry, Transportation

Common Operational Challenges

- Communications, Navigation, Logistics, Environment

Capabilities and Limitations

- Ships, Submarines, Aircraft

Sensing and Prediction

Who Else Operates in the Arctic

NSPD-66 Arctic Region Policy

Maritime Policy





Arctic Brief to CNO

- **A challenge, not a crisis**
- **It's all about the timing**
 - **September 'ice free' conditions probable 25-30 years from now.**
 - **Confidence factor of 2 (on a scale of 1-10)**

Recommendations:

- **Task Force Climate Change**
- **Strategic Partnerships**
- **Continue to Support UNCLOS**
- **Reestablish Arctic Expertise**
- **Invest to Better Understand Arctic Change Timing**





Questions?



CNO at ICEX09 Ice Camp, Mar 09

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