



**Impact of an Ice-Diminishing Arctic on Naval and Maritime Operations**  
*July 10-12, 2007, Washington, DC*



# **Research to Support Arctic Naval Operations**

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**Physical Oceanography**





# Background

- Previous ONR sponsored Arctic research
  - ACOUS, CEAREX, SIMI, SHEBA, SBI, SCICEX, ICEX
- Shift in Navy focus
  - Shift in ONR focus
- ONR High Latitude Program Interests
  - Still There
  - Aligned under Physical Oceanography Program
- Continued steady investment
  - O(\$1.5M)/yr
  - NOPP, IABP, DEPSCOR, IPY, ICEX

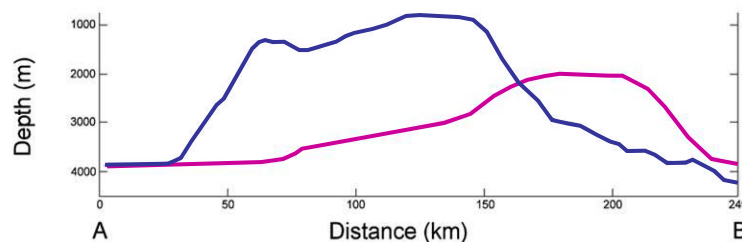
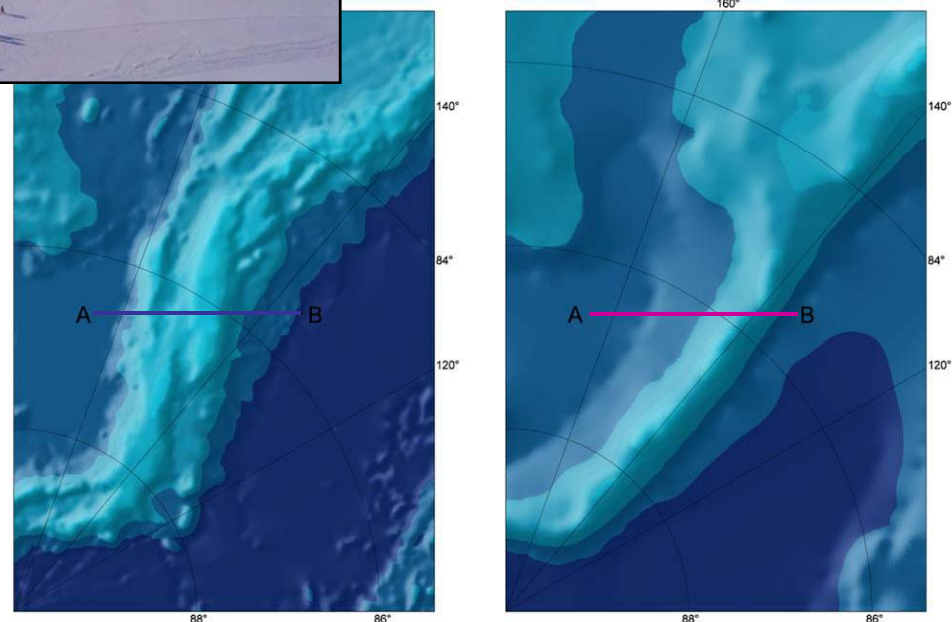
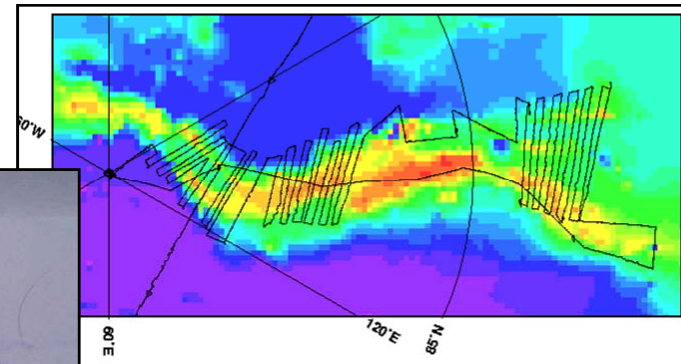


R/V Knorr, Labrador Sea, 1997



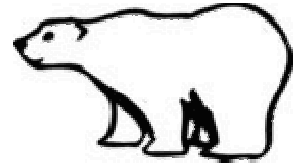
# SCICEX 99

- **USS Hawkbill (SSN 666)**  
**Lomonosov Ridge survey**
  - **Dramatically altered understanding of Arctic bathymetry**
- **IBCAO 2.5 km vs GEBCO**
  - Far more complex morphology
  - Ridge broken into several smaller segments
  - Pronounced kink projecting into Amundsen Basin
  - Crest generally shallower and wider
  - Notably flat-topped at several sections





# Current Efforts



- **National Oceanographic Partnership Program (NOPP)**
  - Coastal Effects of a Diminished-Ice Arctic Ocean (ONR, NSF, MMS, Shell)
    - *A Comprehensive Modeling Approach Towards Understanding and Prediction of the Alaskan Coastal System Response to Changes in an Ice-diminished Arctic.* Maslowski (NPS), Cassano (U Col), Walsh (USF)
    - *Circulation, Cross-shelf Exchange, Sea Ice, And Marine Mammal Habitats On The Alaskan Beaufort Sea Shelf.* Weingartner (UAF), Pickart, Plueddemann (WHOI); Stafford (APL-UW); Moore (NOAA); Holt, Kwok (JPL)
    - *Toward a predictive model of Arctic coastal retreat in a warming climate, Beaufort Sea, Alaska.* Wobus (U Col), Stanton (NPS)
    - *Episodic Upwelling of Zooplankton within a Bowhead Whale Feeding Area near Barrow, AK.* Ashjian (WHOI); Okkonen (U Alaska); Campbell (URI); Stafford. (APL-UW); George (N Slope Dept Wildlife Mgmt); Moore (NOAA)
- **Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)**
  - *Upper Ocean Interactions: Observations and Modeling.* Harper Simmons (UAF)
- **Ice Exercise 2007 (ICEX)**
  - *Time Evolution of the Arctic Sea Ice Thickness Distribution from New Submarine Sonar Measurements.* Peter Wadhams (U of Cambridge)



# Research Questions Remain

- Acoustics
- Navigation
  - MIZ, Leads, Bathymetry
- Global Ocean Circulation
- Climate
- Biology
- Natural Resources



USS Normandy (CG 60) underway in the Arctic Ocean, 12 June 2007



# Future Considerations

- Foreign Policy Changes
- Future Navy Priorities
- Strategy and Operations
  - DHS/USCG, USN
- Vessel Traffic & Design
- Natural Resources
- Global Climate
- Global Ocean Circulation

ICEX 07



USS Alexandria (SSN 757)



HMS Tireless (S88)

# QUESTIONS?

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**USS Harry S. Truman (CVN 75) and USNS Lewis  
and Clark (T-AKE 1), Atlantic Ocean, Feb 07**