Russian-American Long-term Census of the Arctic:RUSALCA:



Pacific-Arctic Research NEEDS

Time Series Measurements @ <u>Regional & Fine Scales</u>

Sea Ice Extent & Thickness Wind Direction & Speed Currents & Productivity Flux measurements Biodiversity Change

integrated with Marine mammal research

* IPY Flagship Projects? Ice edge bio-physics (PAG) Pan-Arctic beluga tagging (GINR)

Potential Cruise Locations for a Pacific Arctic IPY



Estimated Ice Edge (2/10 concentration) position for four multi-disciplinary cruises during the meltback season (based on 2001-2004 ice data)

The Pacific Region of the Arctic Shows Amplified Response to Global Change

HOW DO RUSSIA AND THE USA, THE GATEKEEPERS OF THE PACIFIC GATEWAY TO THE ARCTIC, MOVE FORWARD TOGETHER?

RUSALCA GOALS:

- 1. Take observations Where Arctic Sea Ice reduction is a Maximum
- 2. Monitor Fresh Water and Nutrient Fluxes and Transport Pathways Through the Pacific Gateway.
- 3. Monitor Ecosystem Indicators of Climate Change.
- 4. Improve Russian-U.S. Arctic Climate Science Relations
- 5. Explore the unknown Arctic



GOAL 1 (Sea Ice Thinning Observations)

GOAL 2: Fresh Water Fluxespathways

Increased Fresh Water Flow From the Arctic to the North Atlantic

What are the pathways of fresh water flow across the Pacific Gateway ?



Bering Strait

Measuring the Pacific Input to the Arctic via the Bering Strait

Why? What? Who?

Contraction 10 will will will all with Wales

Little Diomede Island, Bering Strait

Gateway Flux Measurements via Longterm Moorings in Bering Strait



From 1990 to 2005

T, S and velocity at 9m above bottom

A1 = western Channel A2 = eastern Channel A3 = combination of A1/2 A3' (up north) A4 = Alaskan Coastal Current

Not all moorings are deployed all years!

courtesy of Ocean Color Data Processing Archive, NASA/Goddard Space Flight Center, thanks to Mike Schmidt Grey arrow marks the Diomede Islands (Little and Big Diomede). Russian EEZ line passes between the islands.

Salinity and Temperature from the Bering Strait



Western Ch (A1) North BS (A3 A3') Eastern Ch (A2) Alaskan Coast (A4)





ECOSYSTEM INDICATORS OF CLIMATE CHANGE

Goal 4: Improve Russian-U.S. Arctic Scientific Collaboration



(Bering Strait & Chukchi Sea 2003) U.S. Expeditions



Photo from akbrian.net

GOAL 5 Explore The unknown Arctic Ocean



RUSALCA ORGANIZATION FRAMEWORK



RUSALCA Russian Government Partners

- <u>Russian Academy of</u>
 <u>Sciences</u>
 - Shirshov Institute of Oceanology
 - Zoological Institute
 - Institute of Microbiology
 - Pacific Oceanological Institute
- <u>Roshydromet</u>
 - AARI
 - FEHRI

- Ministry of Defense
 - Russian Federation
 Navy
- <u>Ministry of Natural</u>
 <u>Resources</u>
 - VNIIOkeangeologica
- <u>Ministry of Sciences</u>
- Foreign Ministry

RUSALCA U.S. PARTNERS

• NOAA

- CIFAR- University of Alaska
- Smithsonian Institution
- Pt. Stephens Research
- University of Tennessee
- Woods Hole Oceanographic Institution
- Other agencies ?

Structure of the Shipboard Operations

• <u>ROSHYDROMET</u>

Captain and crew

• <u>MINISTRY OF DEFENSE</u>

Chief of Expedition

<u>RUSALCA MISSION COORDINATORS</u>

K. Crane NOAA-M. Zhdanov, Group Alliance

<u>CHIEF SCIENTISTS</u>

- Kevin Wood, NOAA, Terry Whitledge, UAF



SCIENTIFIC PARTY



- SCIENTISTS WRITE PROPOSALS TO THEIR OWN FUNDING AGENCIES
- Russians- Russian Academy of Sciences
- US CIFAR (NOAA's Cooperative Institute at the University of Alaska
- Most teams have both Russian and American partners, e.g. Biodiversity of Fish, Census of Zooplankton, Nutrients



RUSALCA TIME LINE

2003 Sign Memorandum of Understanding, Russian Academy and NOAA

2004 Khromov expedition Bering-Chukchi Seas

•Census of Marine Life and exploration of the Chukchi Sea

•Monitoring current fluxes through the Bering Strait and Herald Canyon

Methane exploration

2005, 2006 retrieval of mooring data 2007, 2008 International Polar Year





Mercury content in air (ng/m³) above Piip Submarine Volcano (isobaths in m)





1300 5500

PIIPS VOLCANO, KOMMANDARSKY ARC. Venting of Greenhouse Gases and Hg to the atmosphere

1.8 1.6

1.4 1.2



Actual RUSALCA Stations, 2004





RUSSIAN METHANE TEAM





A. Sawichev, I. Rusanov and K. Crane, 2004

A. Sawohev, J. Resarce and K. Crane, 2904





Properties overlaid on Potential Density



Rusalca Aug 04



RUSALCA 2005, "Sever" in Nome, Alaska





MOORINGS DEPLOYED 2005 "RUSALCA" Western Bering Strait

