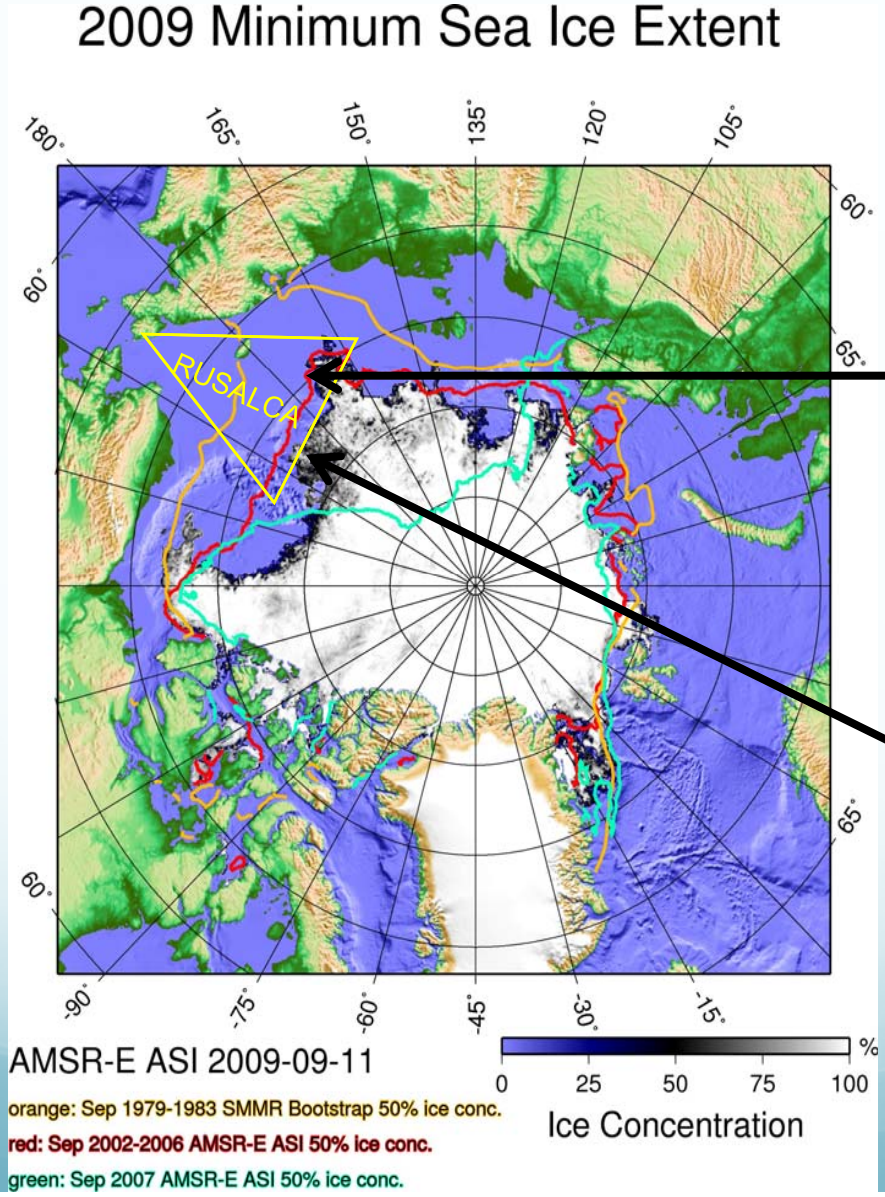
HIGHLIGHTS FROM RUSALCA 2009

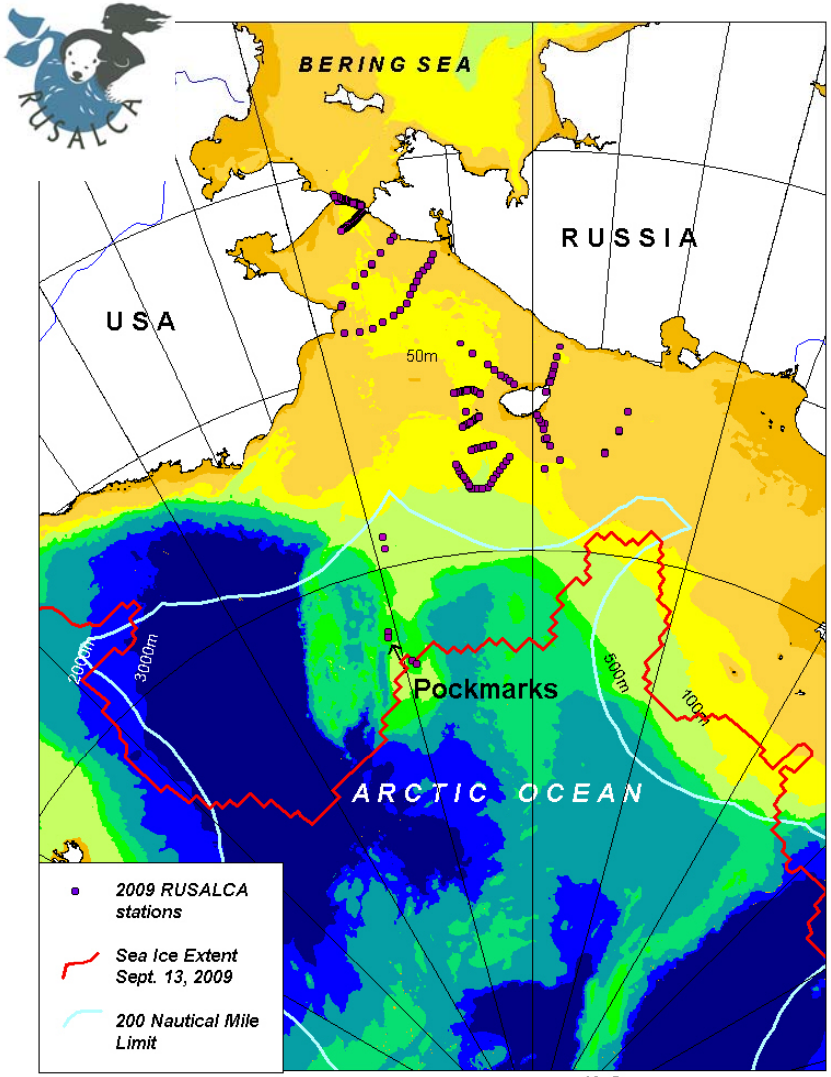
RUSSIAN-AMERICAN LONG-TERM CENSUS OF THE ARCTIC

Kathleen Crane, Arctic Research Program, CPO NOAA, USA U.S. Oversight for RUSALCA
Aleksey Ostrovskiy, Group Alliance, Russia, Russian Federation Oversight for RUSALCA

Recent Changes in the Arctic Ocean Sea Ice Cover, 2009: RUSALCA Region of Study



2009 STATION LOCATIONS



RUSALCA 2009 stations, bathymetry in meters

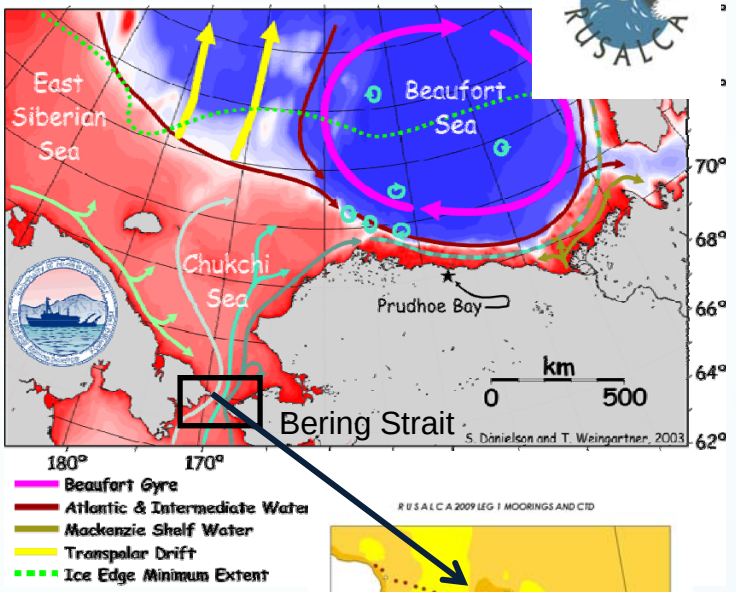
K. Crane
NOAA

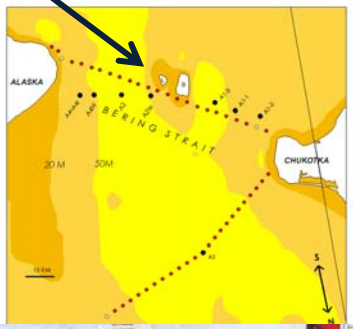
Photos Courtesy of A. Ostrovskiy

Fluxes Through the Bering Strait: Leg 1

Rebecca Woodgate, UW, Chief Scientist
Elena Bondareva, AARI mooring head

- **moorings in Bering Strait show decreased salinity, increase of freshwater flux, and temperature**
- **Bering Strait influx is greater since 1989**
- **Bering Strait is the largest Arctic "river" (~40% of freshwater)**
- **10% of earth's freshwater flows into the smallest ocean with the highest proportion of shelf**
- **currently 7 joint US-Russian moorings part of RUSALCA**
- **2009 Eastern Strait fresher & cooler… waiting for Western data**

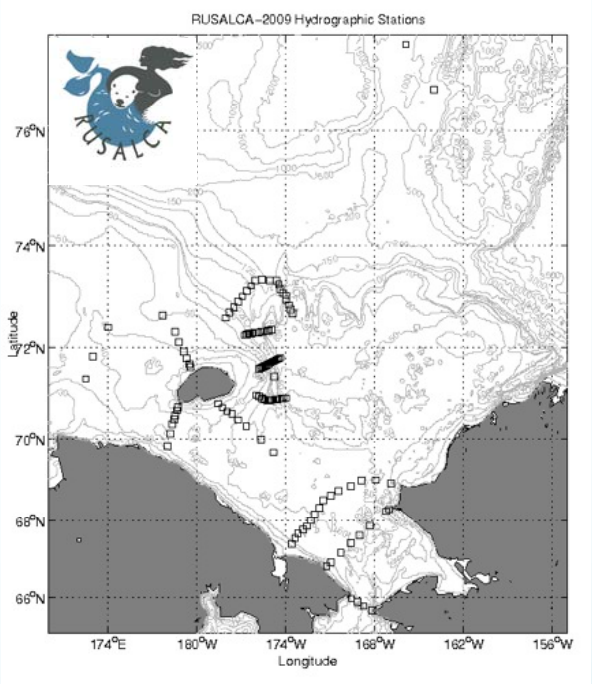




Photos courtesy of A. Ostrovskiy and K. Crane

Changes in Hydrography: Leg 2

R.S. Pickart, H.N. Swartz and D.J. Torres, Woods Hole Oceanographic Institution
E. Bondareva, Arctic and Antarctic Research Institute

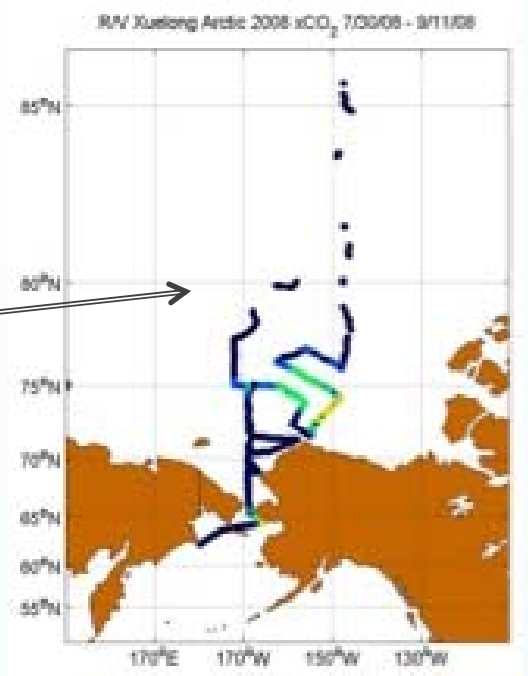


- 134 CTD stations during Leg 2
- WHOI provided rosette mounted with 21 10-liter bottles, Sea-Bird model SBE 911 + CTD profiler, upward and downward looking RDI Workshorse300 kHz ADCP, and a SeaScan Video Plankton Recorder
- High speed survey of the Herald Canyon was carried out, with investigation of the area around Wrangel Island, in the East Siberian Sea and over the Chukchi Plateau.
- Hydrographic conditions were greatly different from 2004 (Maybe a seasonal effect).
- Water masses on the western side of Herald Canyon were warmer than in 2004. On the eastern side of the canyon, the summer water reached farther north than in 2004
- The Siberian Coastal Current extended more than 70 km offshore in 2009. It was not present during the 2004 expedition.

Photo courtesy of RAS-NOAA, RUSALCA 2009

Ecosystem-CO_2 Variability in the Region of Extreme Sea Ice Change

- In 2008 NOAA funded the PCO_2 sampling in the Arctic Ocean using the Chinese Vessel Xue Long. The results showed: a **very large CO_2 sink < 380 ppm** in the entire region, including in the ice



- In 2009 Nick Bates carried out CO_2 studies during RUSALCA Leg 2 north to 77°30'N.

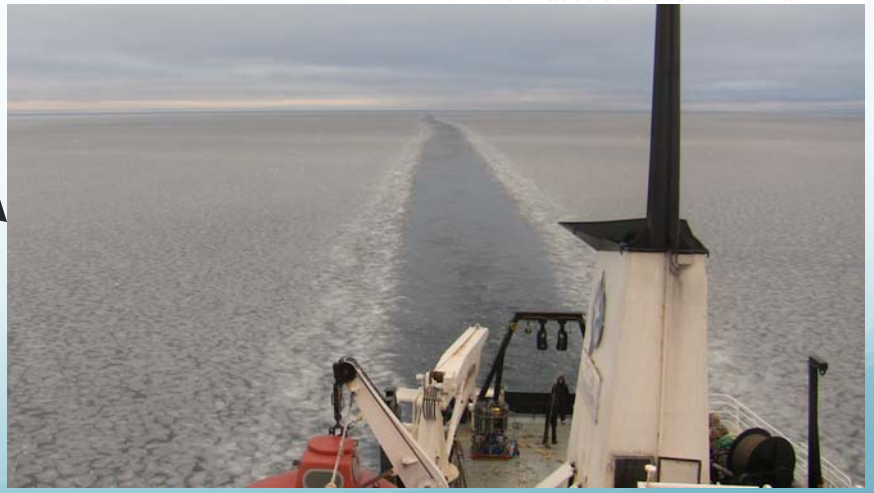
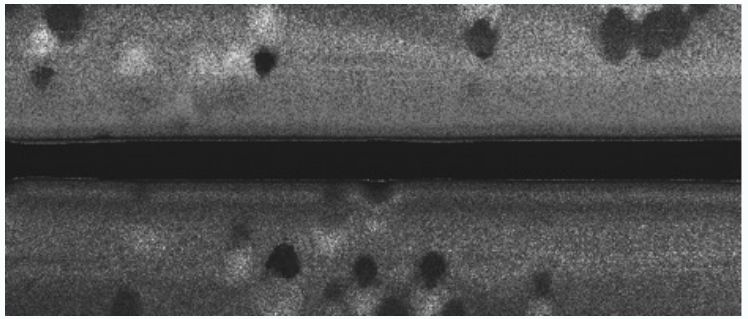


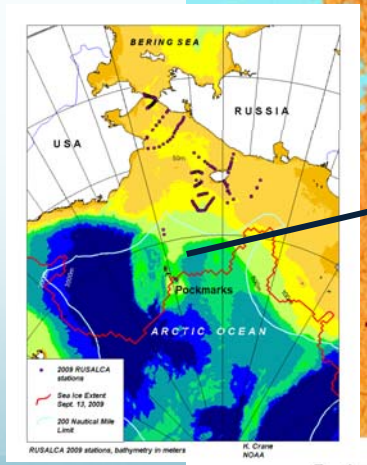
Photo Courtesy of Dan Torres

PACIFIC-ARCTIC SEAFLOOR FLUX OBSERVATIONS :

Tatiana Matveeva and Liza Logvina P.Is



- Objective is to determine the magnitude and distribution of the flux of methane from submarine permafrost and other regions into the Arctic Ocean
- Instrumentation is supplied from VNIIOkeangeologia, Russia,: A SONIC deep-water side-looking sonar 30Khz and sub-bottom profiler were used for the investigations.
- Investigations took place along the Herald Canyon and above a pockmark field located on the Chukchi Plateau. To date, no evidence of present day methane fluxes have been located

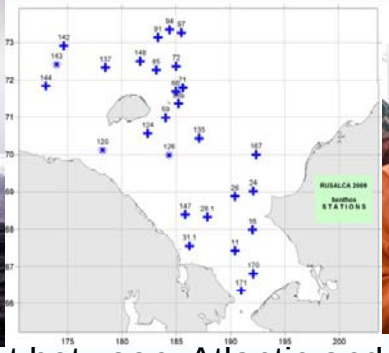


Multibeam sonar map from Healy, 2003, 76.5°N

Climate Change Impacts On Benthic Life

Zoological Institute of RAS S. Denisenko, P. Strelkov, D. Petrova,
UAF S. MIncks J. Weems (Iken and Bluhm), UMD, J. Grebmeier, L. Cooper

INITIAL RESULTS:29 Van Veen Grabs; 270 Tissue Samples from Trawl



Photos RAS-NOAA RUSALCA 2009

•Genetic Relational Studies to be carried out between Atlantic and Pacific Arctic Species

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•Zoobenthic biomass to NW of Wrangel is much higher in 2009 than in previous years. High density of large isopods.

•Highest infaunal biomass at the head of Herald Valley: hotspot of *Macoma* bivalves

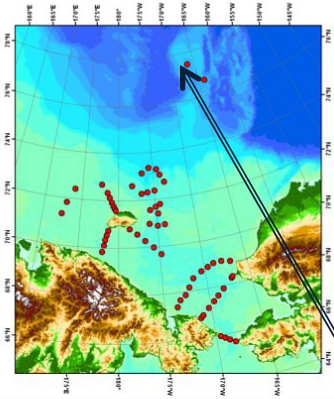
•Pockmark site lowest observed biomass

•Oxygen uptake highest under Anadyr water and East Siberian Sea and Long Strait. Large isopods

•Video imagery illustrated that benthic biomass is heavily underestimated by Van Veen sampling.

Impacts: Probable Migration of Fish Northward

Surveys west to the East Siberian Sea and North to 77°30



Principal Investigators

Natalia Chernova, Daria Petrova, Catherine Mecklenburg, Brenda Holladay, Christine Gleason, Morgan Busby, Brenda Norcross

25 stations.
The most northerly trawl ever taken in the Pacific Arctic region.
22 species were collected; many species are rare to science.

14 additional Species were collected during RUSALCA 2009

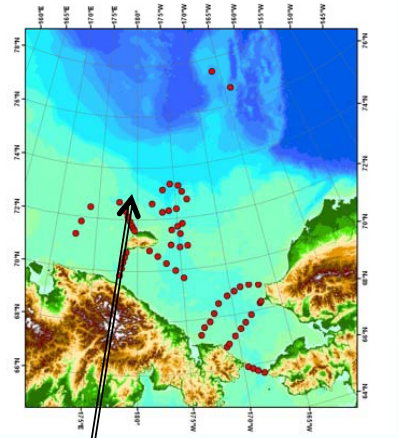
Photos courtesy of Dan Torres

Deciphering Biodiversity Changes in the Water Column: Zooplankton

Principal Investigators:

Ksenia Kosobokova, Shirshov,

Russ Hopcroft UAF



- 63 stations for species identification
- To assess the health of the zooplankton
- Population egg production experiments were carried out.
- Strong across-shelf differences occurred in the northern domain and strong east-west gradients in the southern Chukchi Sea.
- Small jelly fish and isopods were common in the NW region near Wrangle Island
- Alaska Coastal Current pteropods were common.
- Compared to 2004, meroplankton and larvacean were less abundant. in the region.

Photo courtesy of RAS-NOAA, RUSALCA 2009

Fate of Ice and Non-ice Dependent Marine Mammals

RUSALCA Point of Contact, Sue Moore, NMFS, NOAA

Locations Vs Ice edge and regions of high productivity

•Rare opportunity to search for marine mammals in East Siberian Sea and Far north

•7 species of marine mammals were observed; bowhead, gray and humpback whales, walrus, ringed and bearded seals and polar bears

•>100 gray whales spotted over the benthic hot spot
•67-67.5°N and 169.33-169.666 W

•Gray whales spotted north of Wrangle Island- may be a northern range record for this species.

•Bowheads observed in Herald Canyon.

•80 walrus hauled out on narrow sliver of ice north of Wrangle Island.

Photos Courtesy of RAS-NOAA, RUSALCA, 2009

Changes in Nutrients and Productivity

- Quantify the range of nutrients, phytoplankton biomass and productivity in water masses
- Establish physical and chemical factors that are conducive to large rates of primary production
- Compare contemporary rates under warm conditions with those from the previous decade
- 8 productivity bottle experiments
- 49 stations

P.I.'s Terry Whitledge, Sang Lee, Hyoung Min Joo and Mike Kong

Photo courtesy of RAS-NOAA, RUSALCA 2009

Changes in Microbiological and Biogeochemical Aspects of the Carbon and Sulfur Cycles

P.I. A.S. Savvichev, E.E. Zakharova, Vinogradsky Institute of Microbiology, RAS

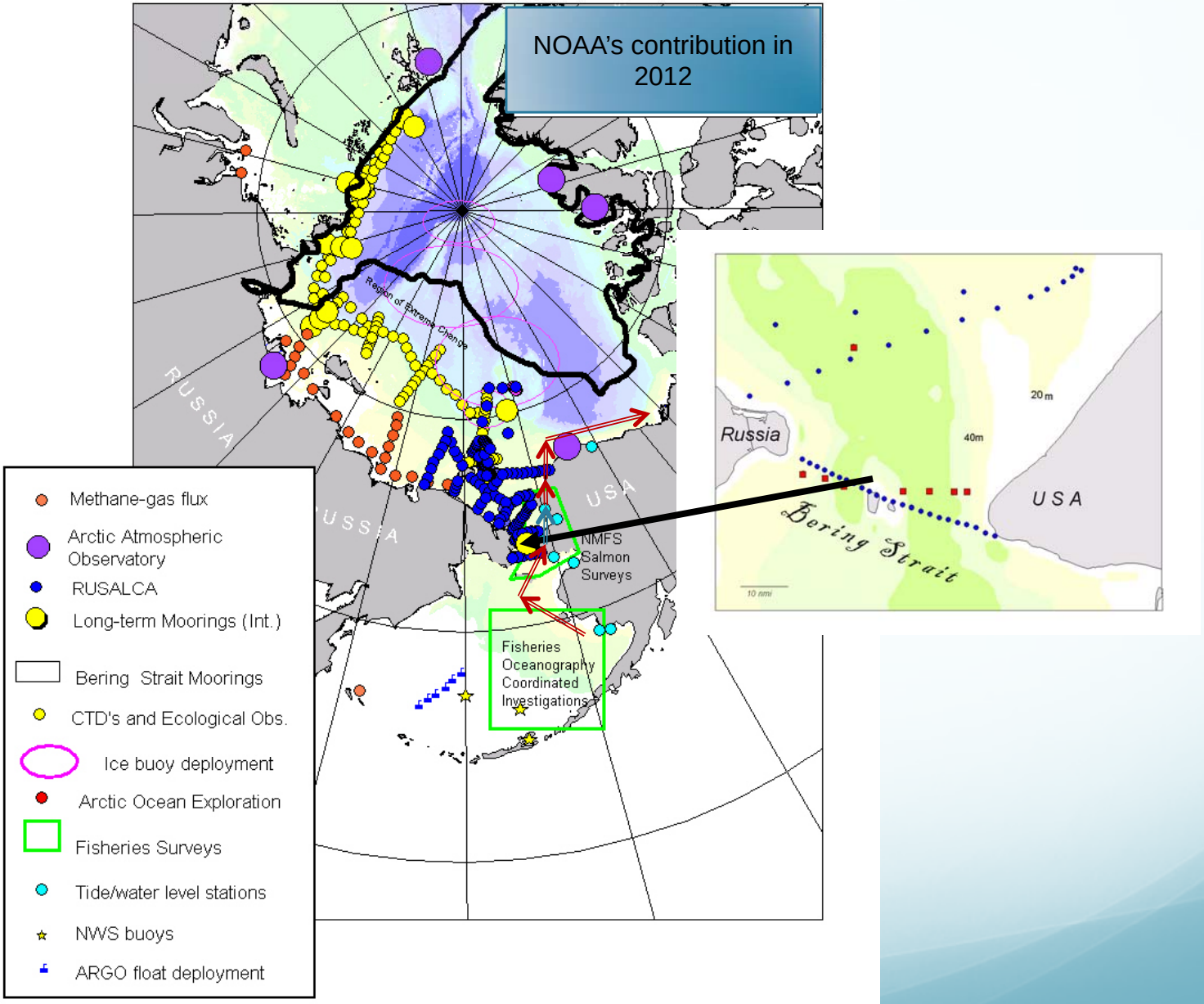
- A warming of the Arctic climate is expected, which can cause a substantial increase in microbial methane production; the quantitative characterization of this process is therefore important. Increased methane production may lead to elevated concentrations of methane in the atmosphere and therefore to further warming.

As a whole, preliminary results indicate that there is a rather high activity of microorganisms in the near surface of the Chukchi Seafloor.

•Major investigation took place in the Herald Canyon and on the Chukchi Plateau at the Pockmark site.

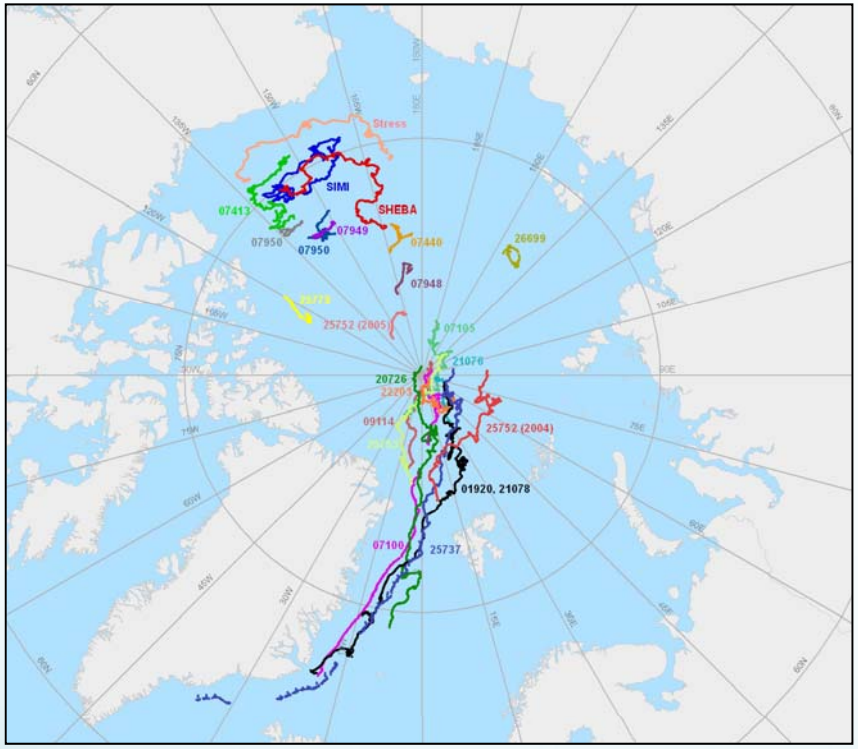
Photo courtesy of RAS-NOAA, RUSALCA 2009

Proposed 2010-2012 Observations



Ice Mass Balance Buoy Network

2000 - 2009



- **Repeated installations:**
  - **North Pole Environmental Observatory**
  - **Beaufort Gyre**
- **IPY deployments as part of Arctic Observing Network**

Observed regional variability

- **Most pronounced difference in surface melt**
- **Consistent with solar input as function of latitude**