RESEARCH AREA NO.: 1
THEME NO.: 1

TITLE:  Monitoring of the Arctic Ocean climate

PI:  Igor Polyakov (IARC/UAF)
CO-PI:  Takashi Kikuchi (JAMSTEC)
Participant: Vladimir Ivanov (IARC/UAF)

MEMBERS’ ROLES: Jointly establish and maintain the Arctic Ocean Observational System designed to monitor major changes in the Polar Basins
OBJECTIVES:

- To provide new high-quality oceanographic data in areas of the Arctic Ocean where data coverage is low and oceanographic records are extremely rare.

- To address key questions and problems associated with processes shaping water-mass structure and variability over multiple time scales.

- To sharpen understanding of physical mechanisms behind the ocean-ice-air energy and mass exchange, which is critically important for predicting future state of arctic ice and ocean.
METHODOLOGY:

- To recover and deploy along-slope moorings and carry out complementary oceanographic survey.
- To continue analysis of newly available information collected during oceanographic cruises.
- To coordinate international collaborations on the Arctic Ocean monitoring especially on the mooring-based observation along the Atlantic Water pathway.
Summer 2013 NABOS cruise: Multidisciplinary experiment provides unique data
New technologies delivery information about heat fluxes from the Arctic Ocean interior

Red oval on the map shows the region where glider was operated in summer 2013
2013 survey: Preliminary results

Water masses are clearly identified via chemical analysis

Salinity

Meteoric water

Sea ice melt
2013 survey: Preliminary results

Contribution of each water mass to overall water mass census via chemical analysis

Fraction of Atlantic water

Pressure (db)

Distance [km]
Arctic Ocean was, on average, 0.24°C warmer in 2007 compared with the 1990s.
North Pole – 35 Drifting Station: Evidence for deep mixing driven by winter convection due to ice formation
Dramatic reduction of heat in the upper pyconocline
Decrease of heat content in the 65-100m layer and associated upward heat fluxes in the Amundsen Basin of the Arctic Ocean
These observations suggest ~1 W/m² for AW heat flux whereas balance estimates suggest ~6-8 W/m². Can we reconcile these estimates?
SUMMARY

Our analysis demonstrates strong upward heat fluxes from the ocean interior in the central Eurasian Basin.

Water mass census will be evaluated using newly available chemical data.

Several joint publications are out; several papers are submitted or close-to-be submitted.