Igor Polyakov, Vladimir Ivanov and NABOS-2 team

Merging observations in the Eastern and Western Arctic

Pacific Arctic Group meeting, April 21-22, 2015, Tokyo, Japan

Overarching goal of 2012-2017 study, as an element of the Arctic Observing Network: to compile a cohesive picture of climatic changes in the Eurasian and Makarov basins (EMB) of the Arctic Ocean, with particular focus on understanding three major observational targets:

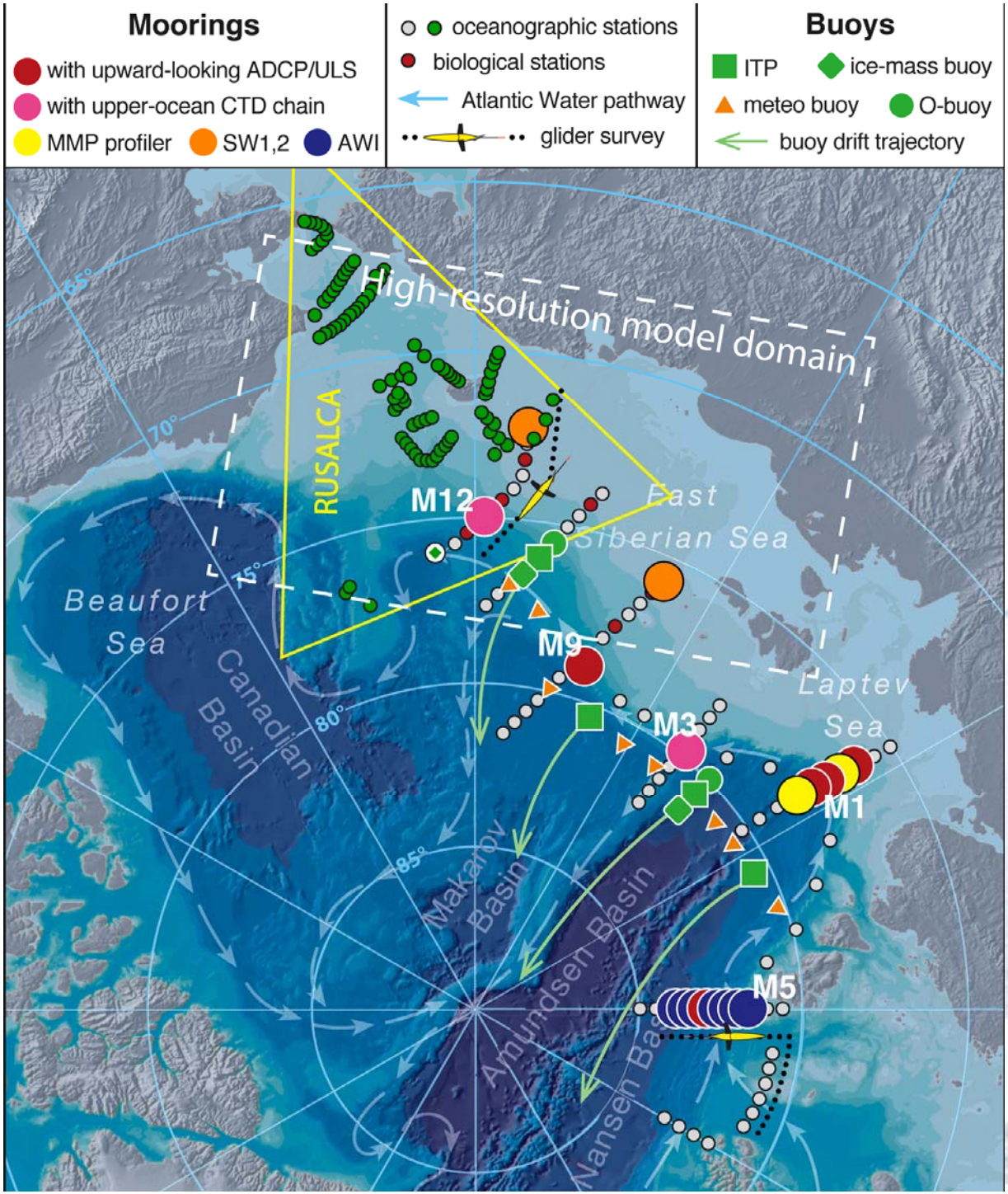
Target #1: *Along-slope Atlantic Water (AW) transport by boundary currents.*

Target #2: *Interaction of AW branches with shelf waters, deep basin interior, and upper ocean.*

Target #3: *EMB indications of changes in upper-ocean circulation.*

The **specific objective** is to develop a comprehensive, quantitative understanding of the role of the upper ocean and halocline in regulating heat and freshwater transports, and projecting their effects upon ecological components of the ESS/MB, toward improved predictions of the role of the ocean in a new, seasonally ice-free Arctic

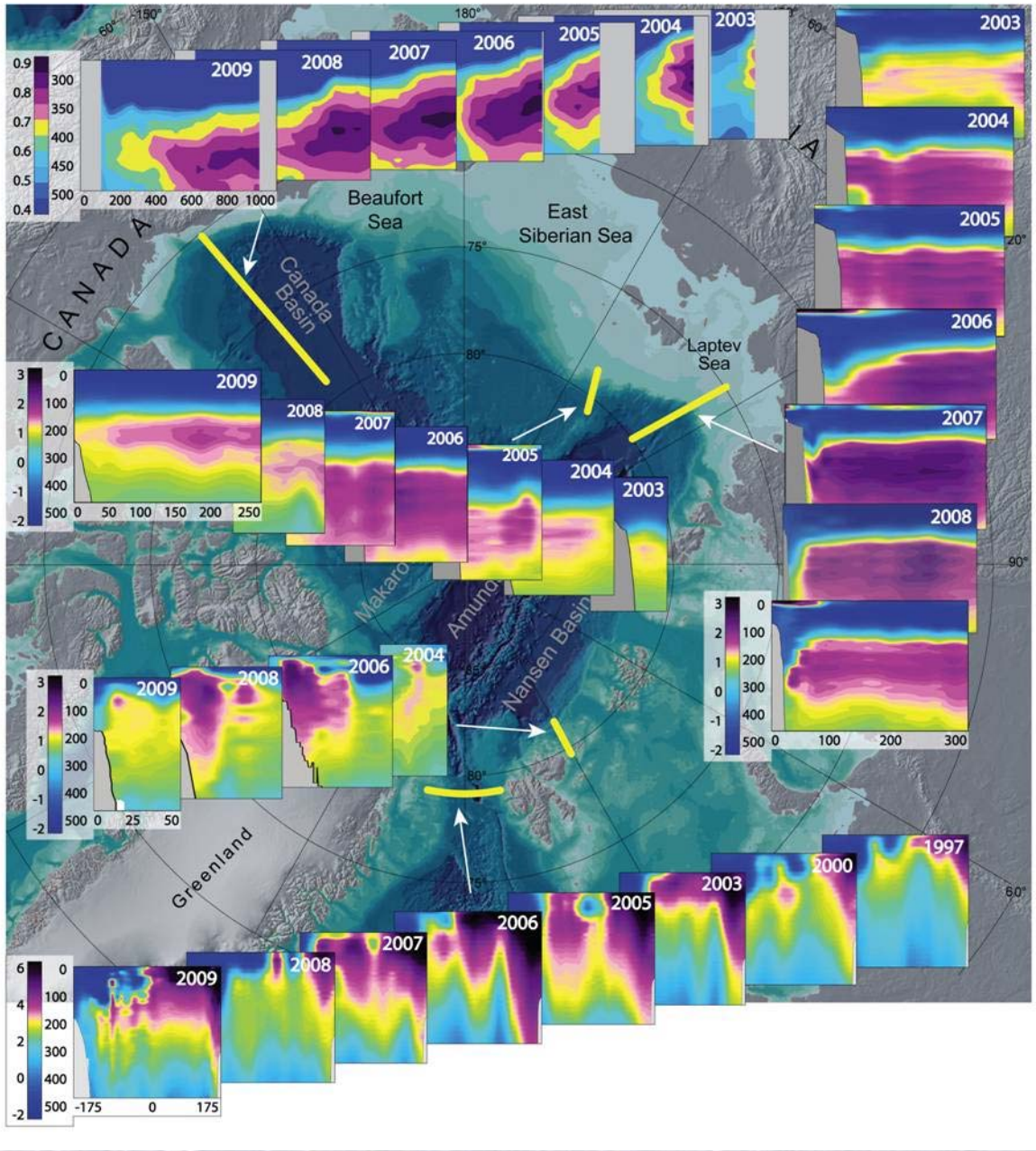
Method: A combination of multidisciplinary observations using repeated sections, moorings and Lagrangian drifters and gliders.



NABOS part: Plans for summer 2015.
RUSALCA part: Observations from previous years.

Excellent fit!

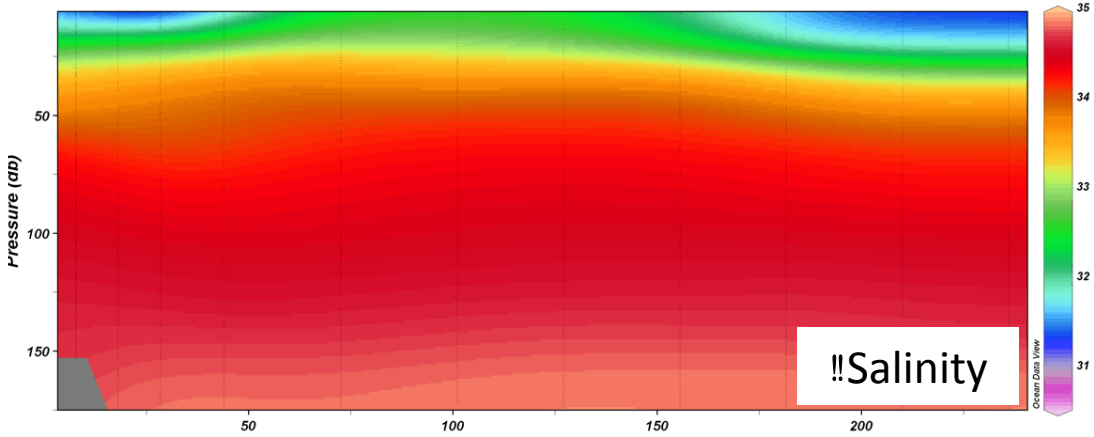
REPEATED SECTIONS IS A POWERFUL APPROACH



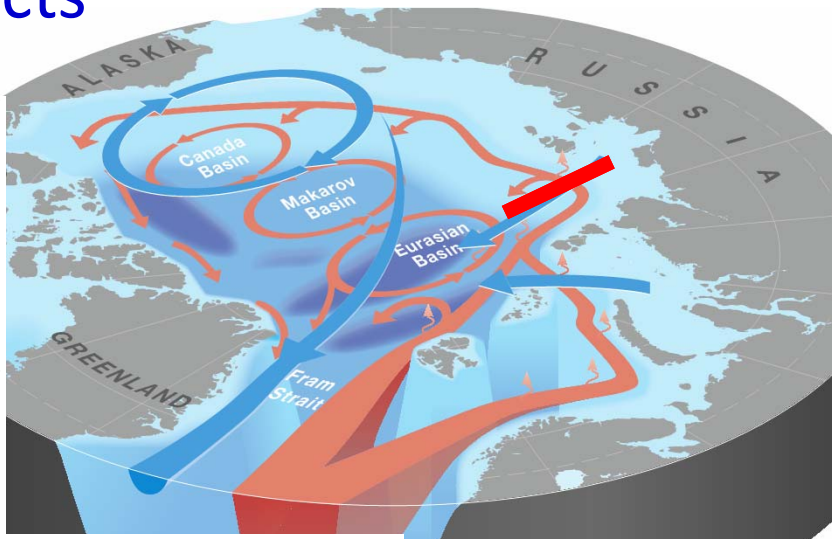
Pulse of warm intermediate Atlantic Water (2000s): 0.24°C warmer than 1990s.

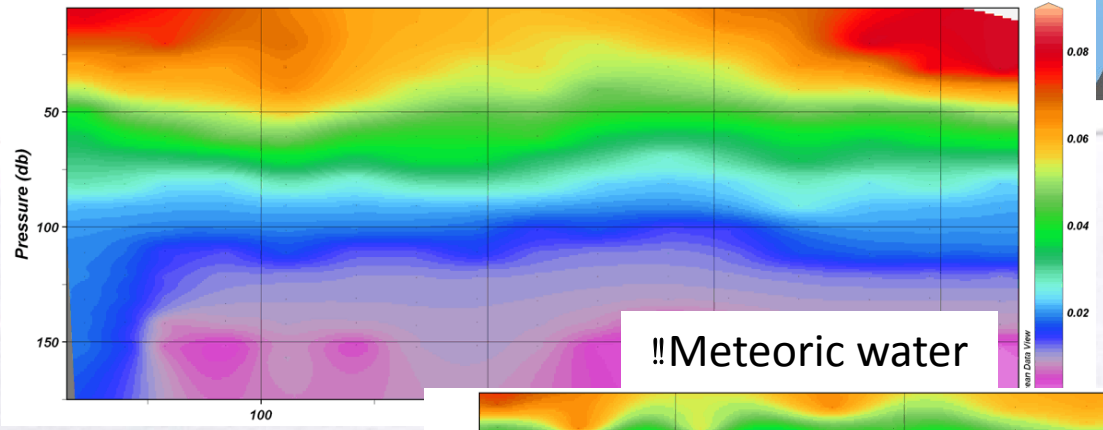
Polyakov et al., 2011

Traditional observations at transects



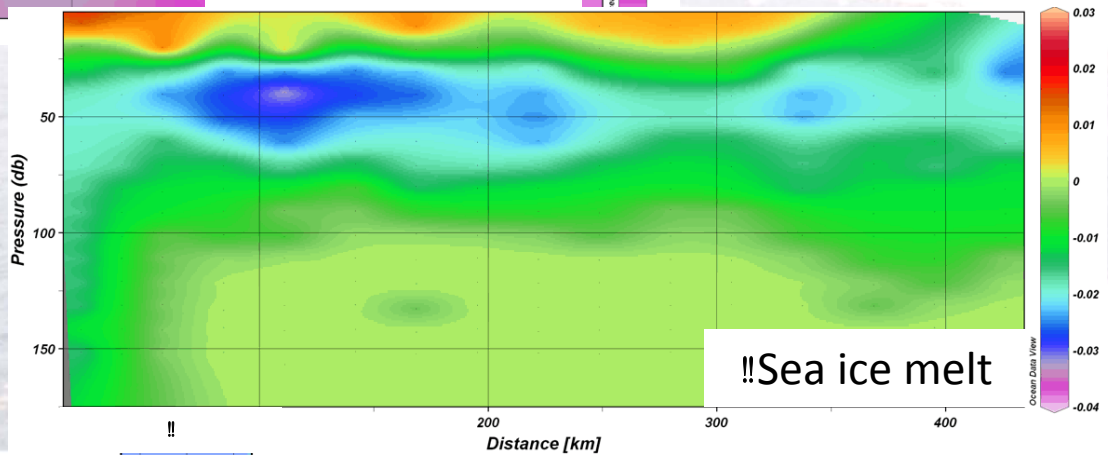
‼Salinity





‼Meteoric water

Water masses are clearly identified via chemical analysis

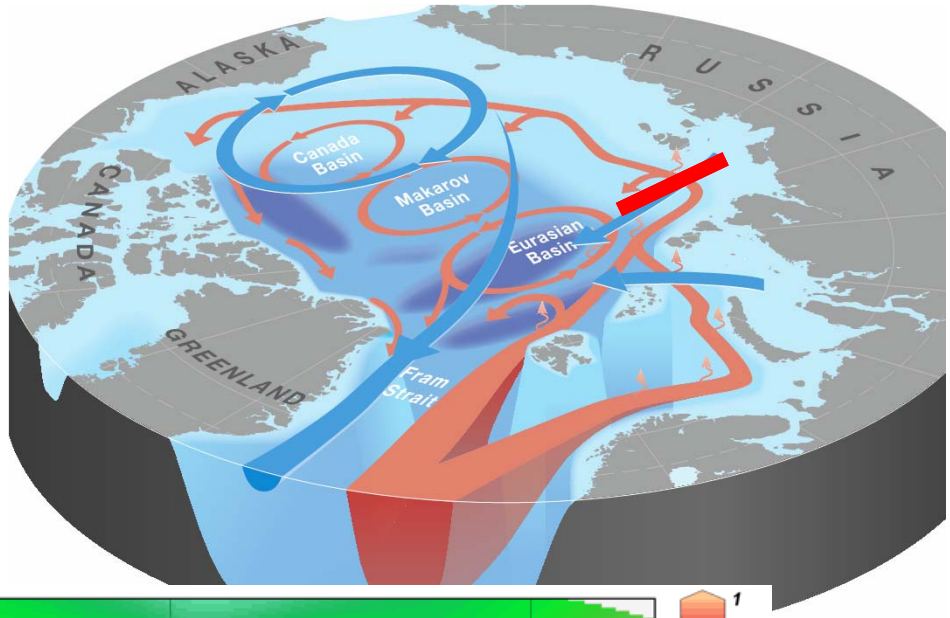


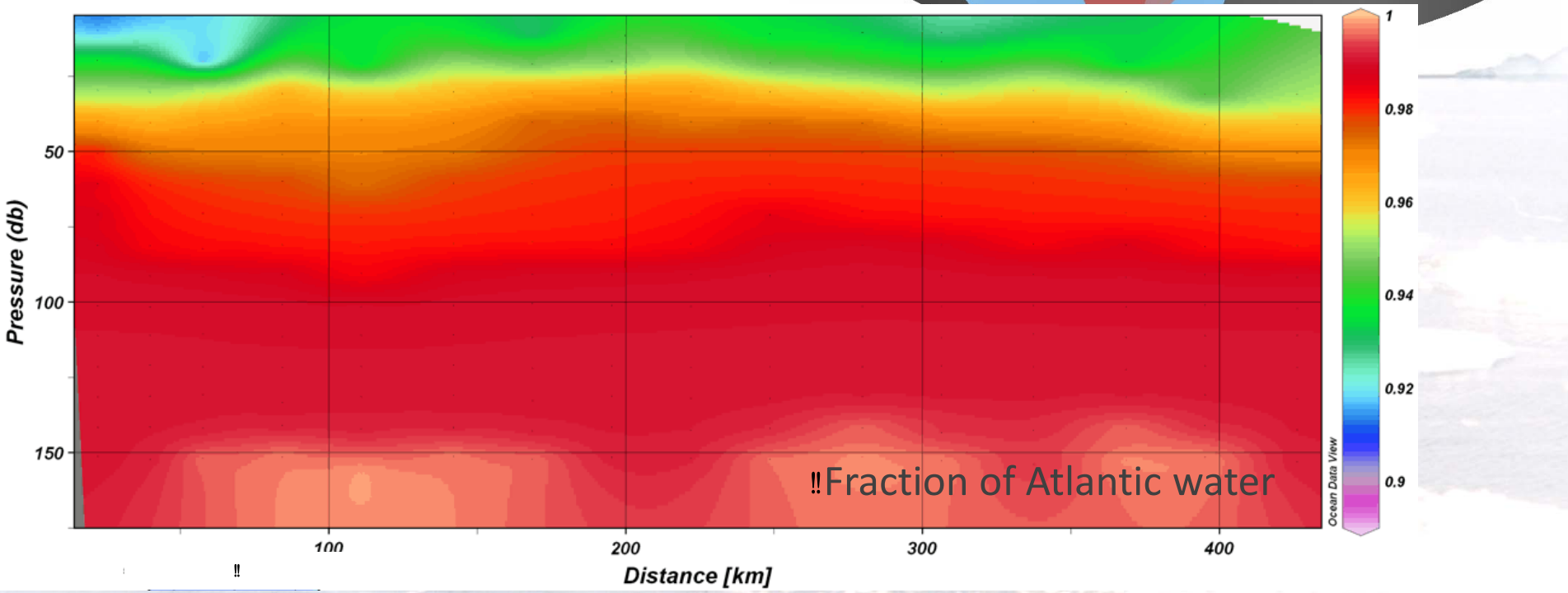
‼Sea ice melt

‼

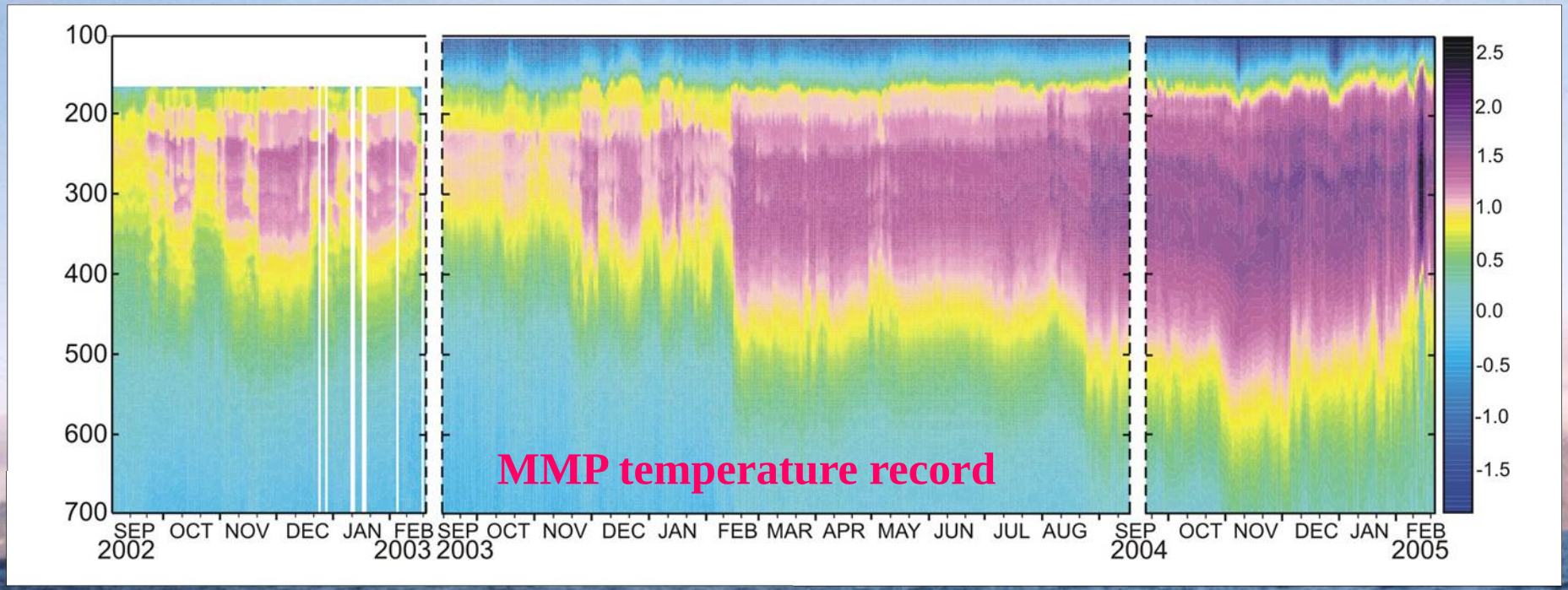
Traditional observations complemented by specialized chemical observations

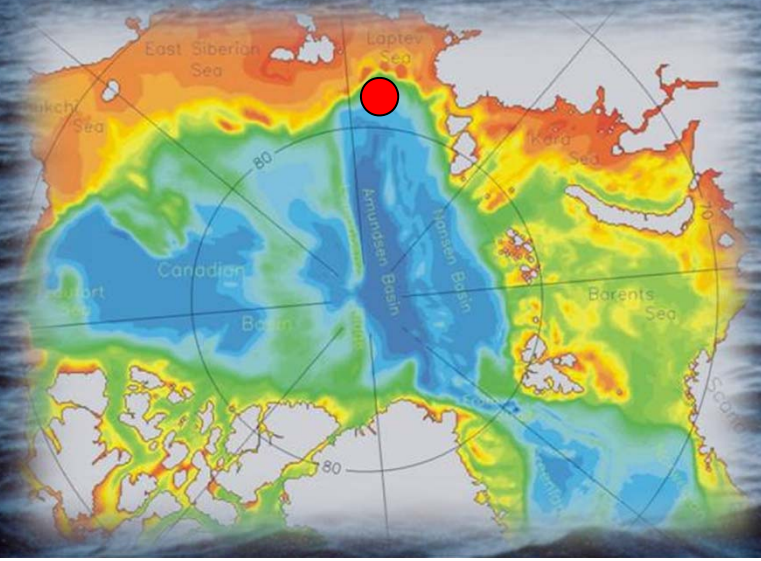
Contribution of each water mass to overall water mass census via chemical analysis





***Moorings are a powerful tool**: Documenting warming*

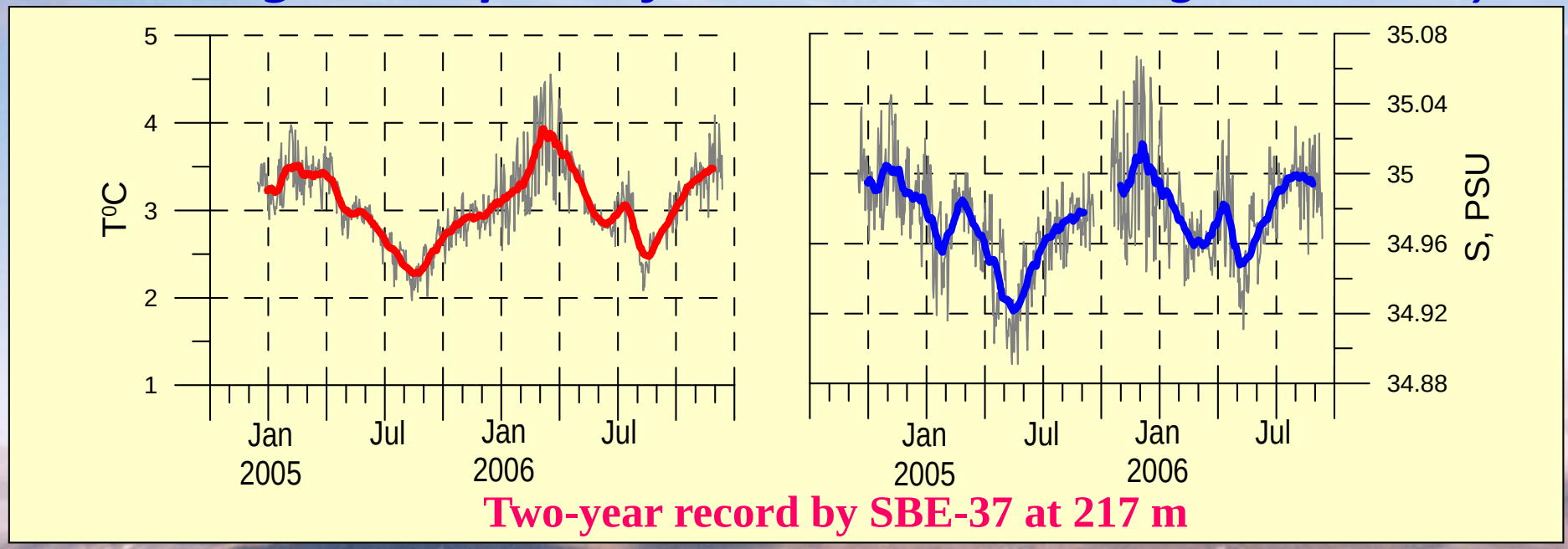




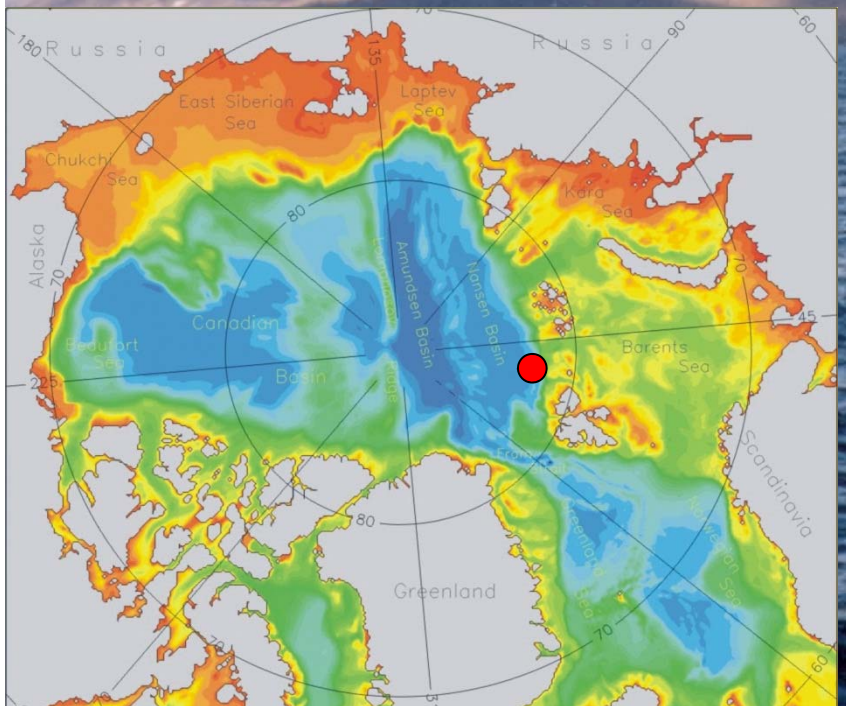
Abrupt Atlantic Water warming captured in the Laptev Sea in 2004.

Polyakov et al., 2005

***Moorings are a powerful tool**: Documenting seasonality*



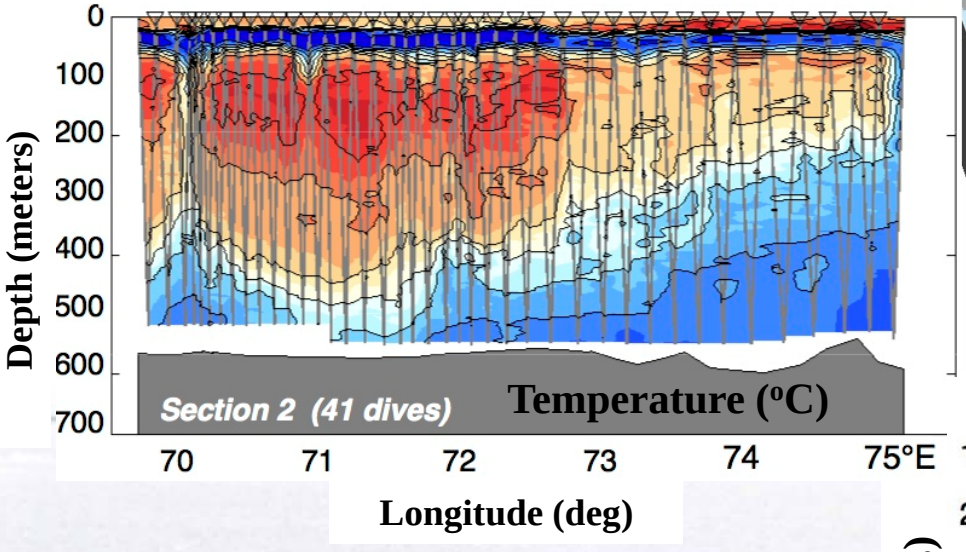
Two-year record by SBE-37 at 217 m

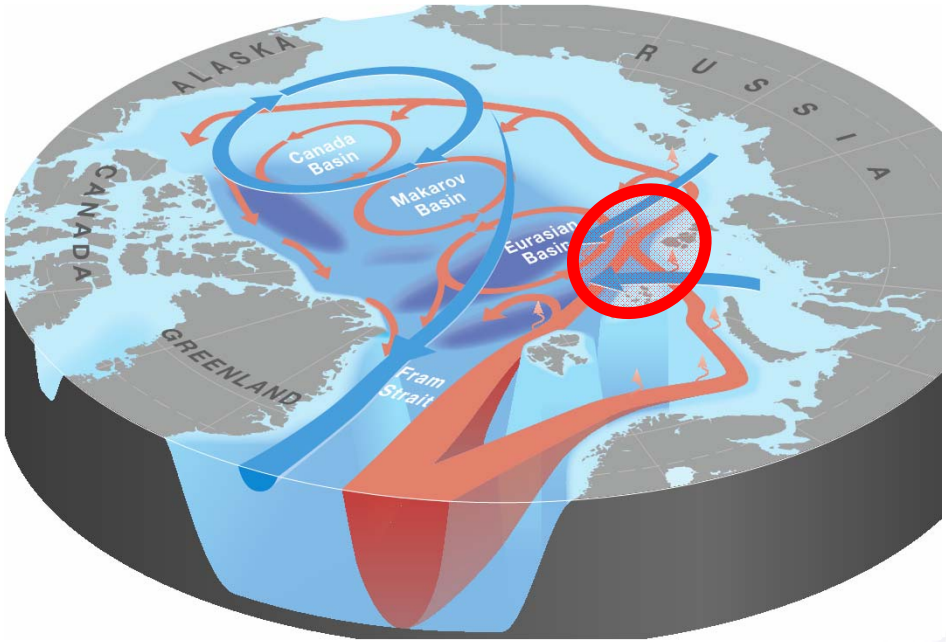


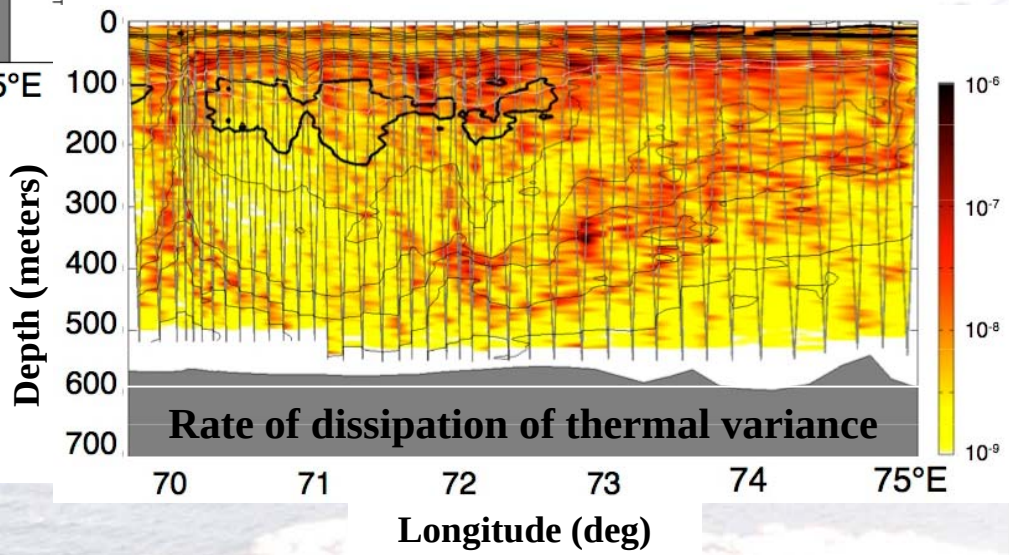
Distinct seasonal cycle (~1^{0}C amplitude) was revealed deep in the water column under the pack ice

(Ivanov et al., 2009)

New technologies: *delivering heat flux information from Arctic Ocean interior*

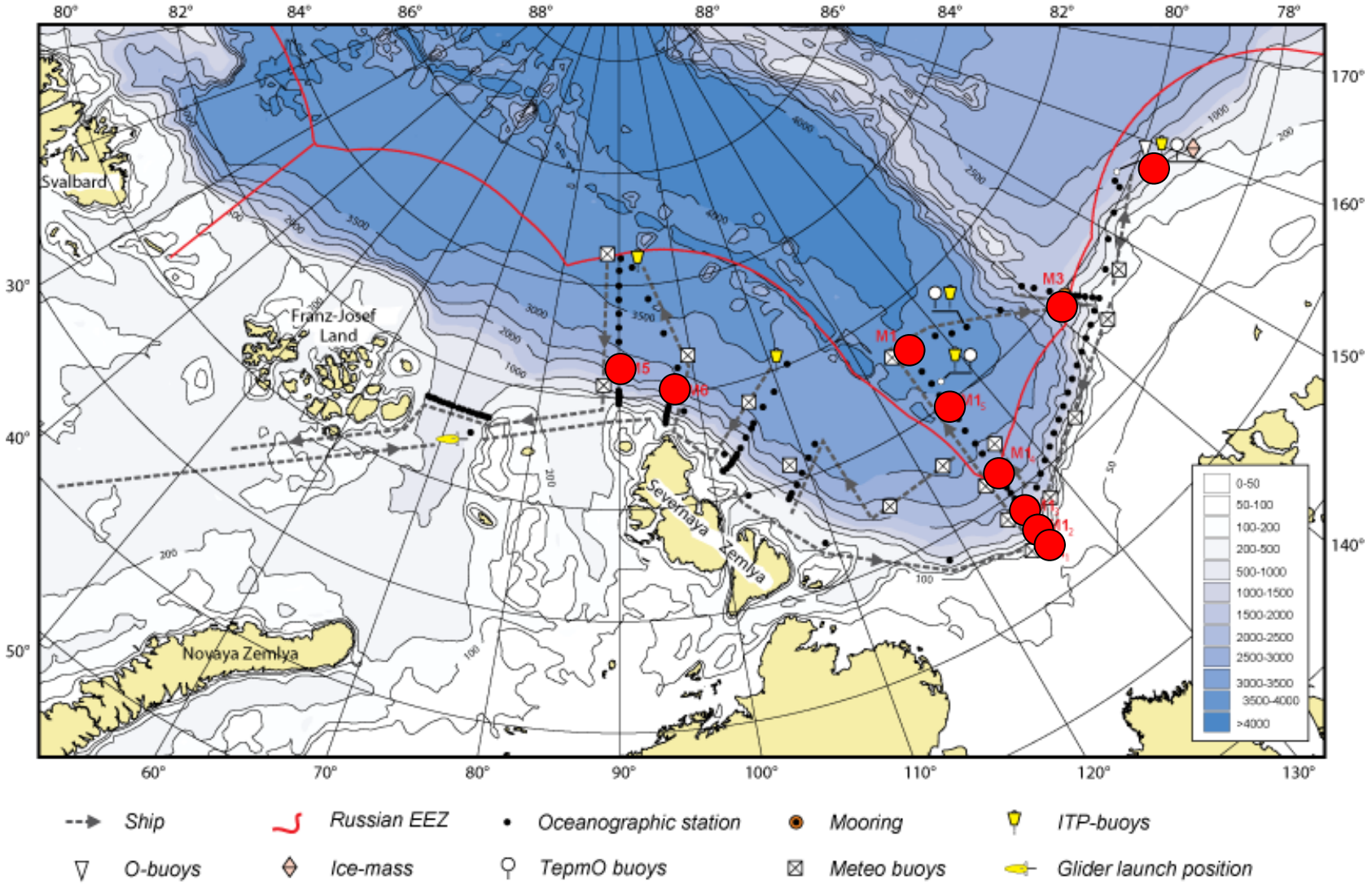






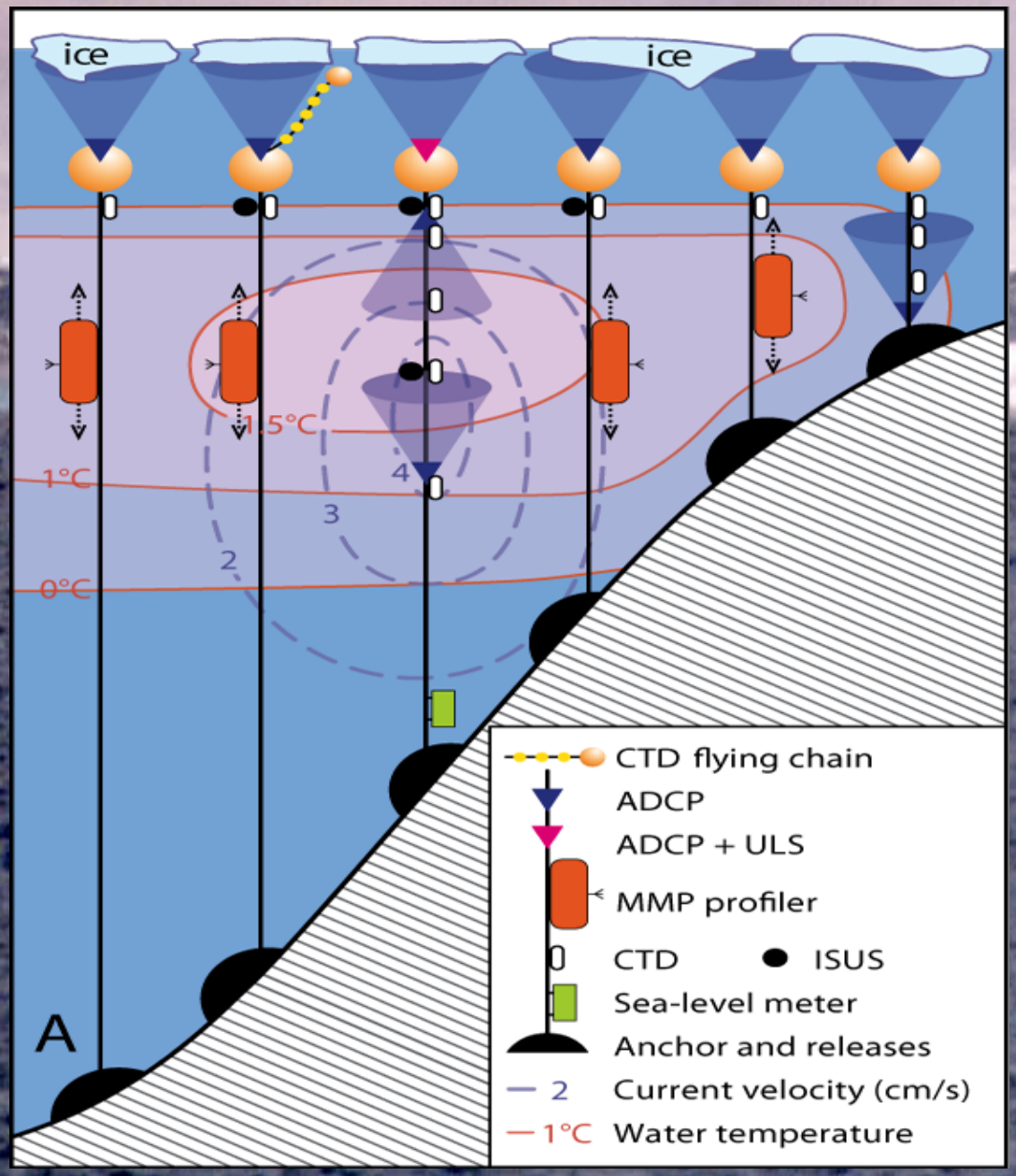
Red oval: St. Anna Trough at ~80°N, where glider operated, summer 2013

2013 field campaign: Moorings



Mooring-based element of the observational network

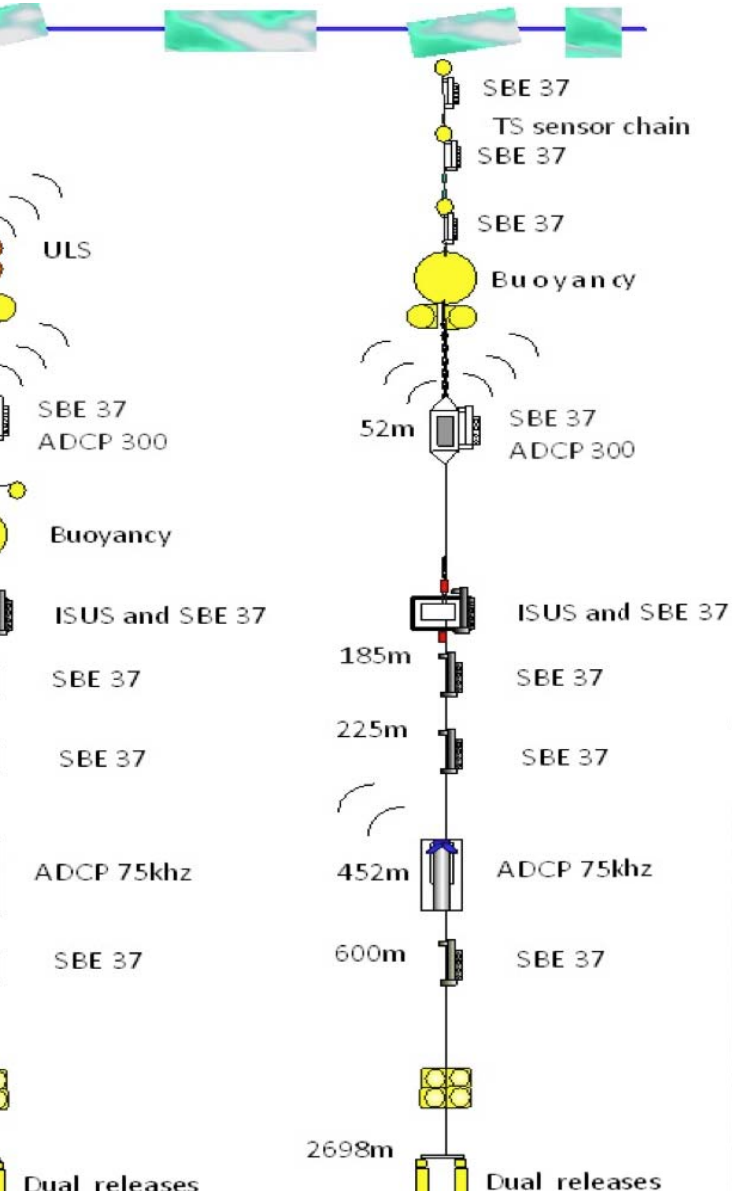
Mooring-based cross-slope section at the central Laptev Sea slope region (~125°E) deployed in 2013.

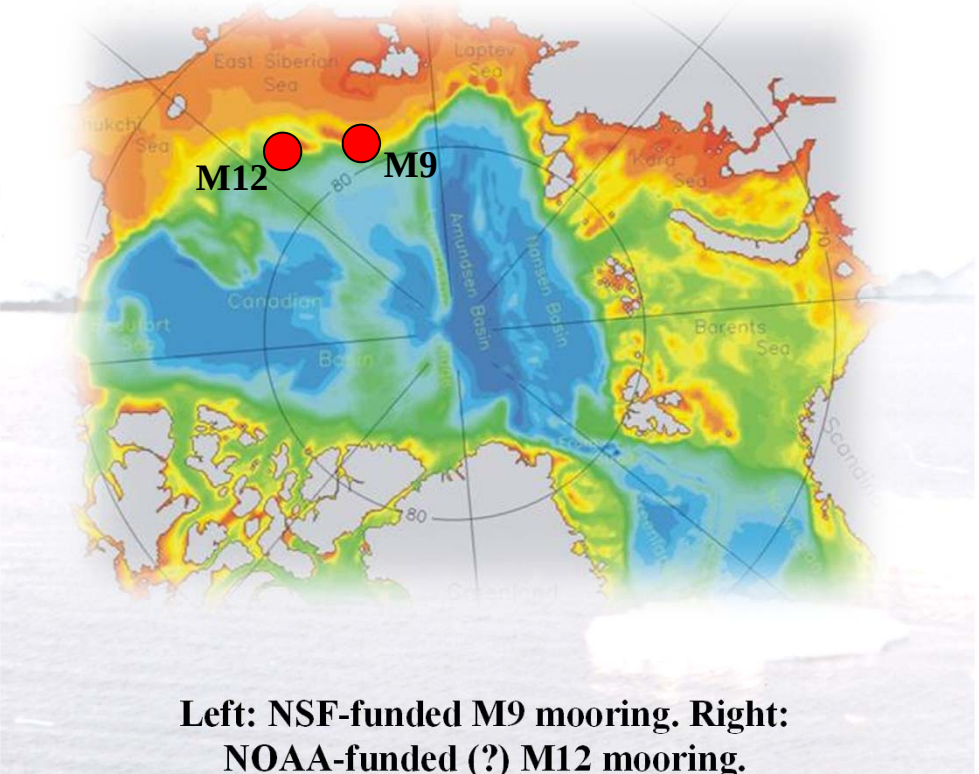


Some of our moorings have upper ocean CTD chains…

15 SBE-56 and three SBE-37 distributed over a 40m chain

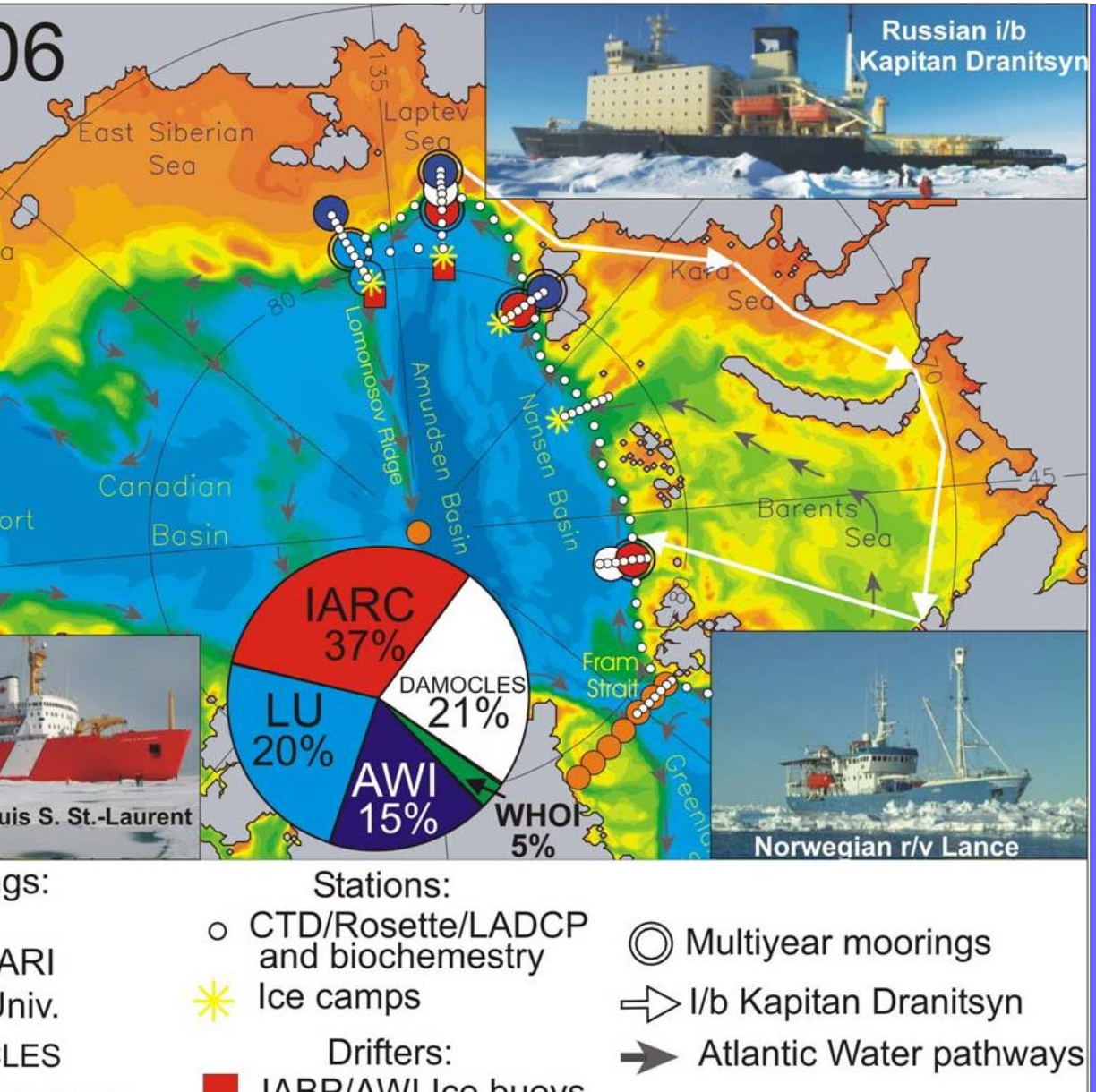
ESS deep-water moorings





Left: NSF-funded M9 mooring. Right: NOAA-funded (?) M12 mooring.

Truly international



Field Experiments

SUMMARY

ABOS scientific results: essential for understanding on-oing changes in high-latitude regions

ABOS: 15 years experience working in harsh Arctic onditions

stablished observational network: an important lement of the Arctic Observing System

Vide international recognition, extending from articipation of many countries' researchers in project ctivities

onduit for application of new technologies in Arctic