Igor Polyakov, Vladimir Ivanov and NABOS-2 team

NABOS-II observations in summer 2015 in the Laptev Sea and the East Siberian Sea

Pacific Arctic Group meeting, October 28-29, 2015, Incheon, Republic of Korea

Overarching goal of 2012-2017 study, as an element of the Arctic Observing Network: to compile a cohesive picture of climatic changes over continental slope and deep basins of the Arctic Ocean, with particular focus on understanding three major observational targets:

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

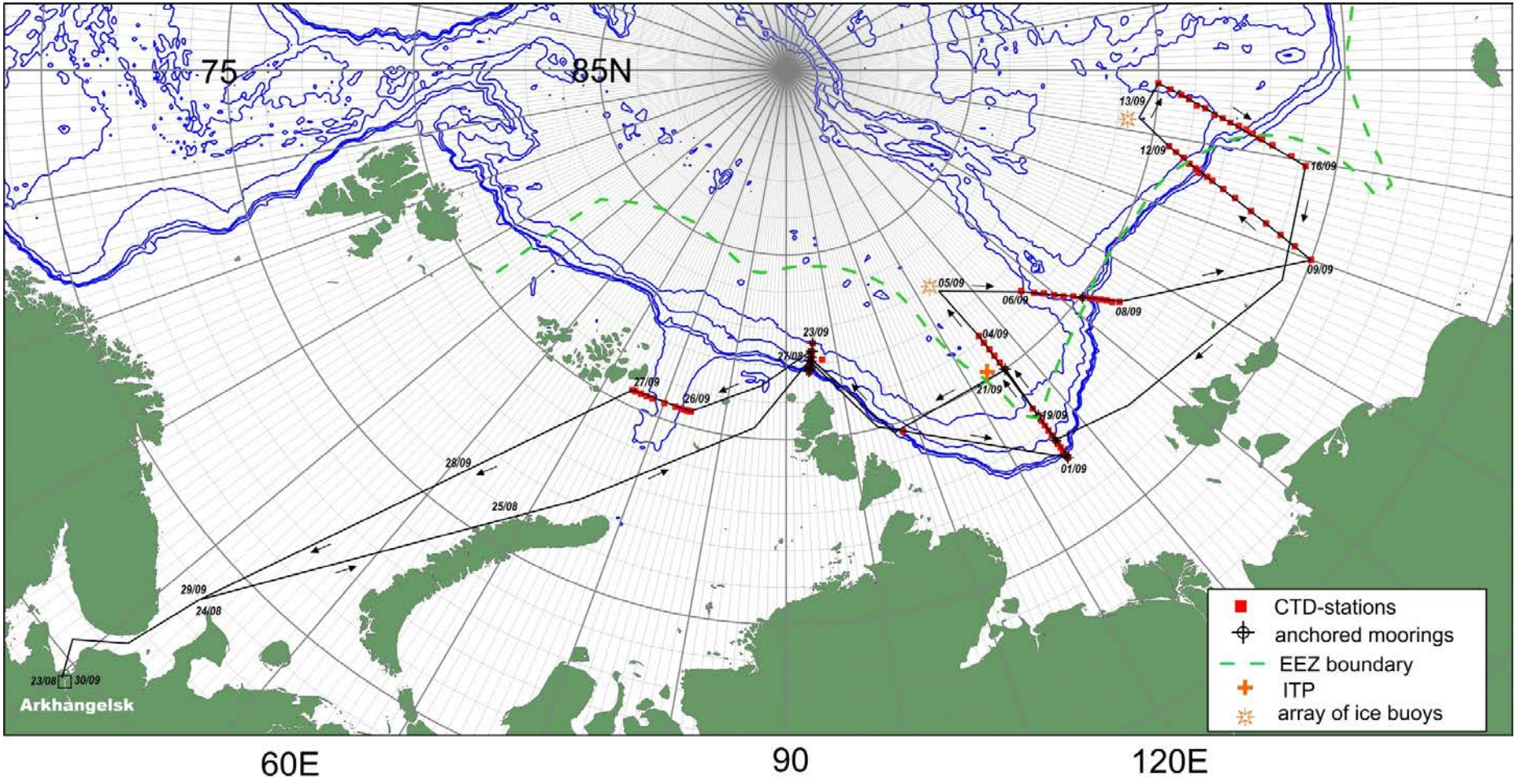
Target #2: *Interaction of AW branches with shelf waters, deep basin interior, and upper ocean.*

Target #3: I*ndications of changes in upper-ocean circulation and thermohaline structure.*

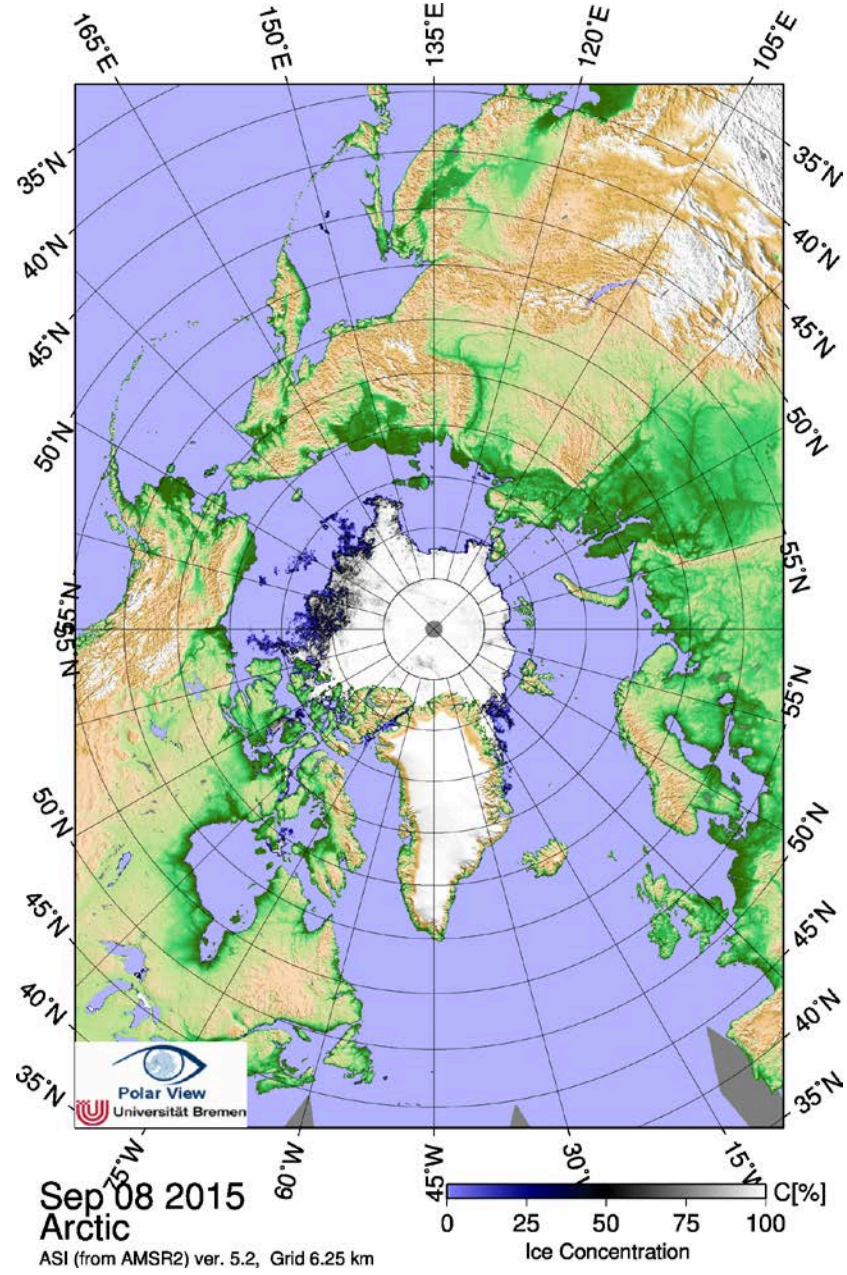
The **specific objective** is to develop a comprehensive, quantitative understanding of the role of the upper ocean and halocline in regulating heat and freshwater transports, and projecting their effects upon ecological components of the shelf and deep areas toward improved predictions of the role of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

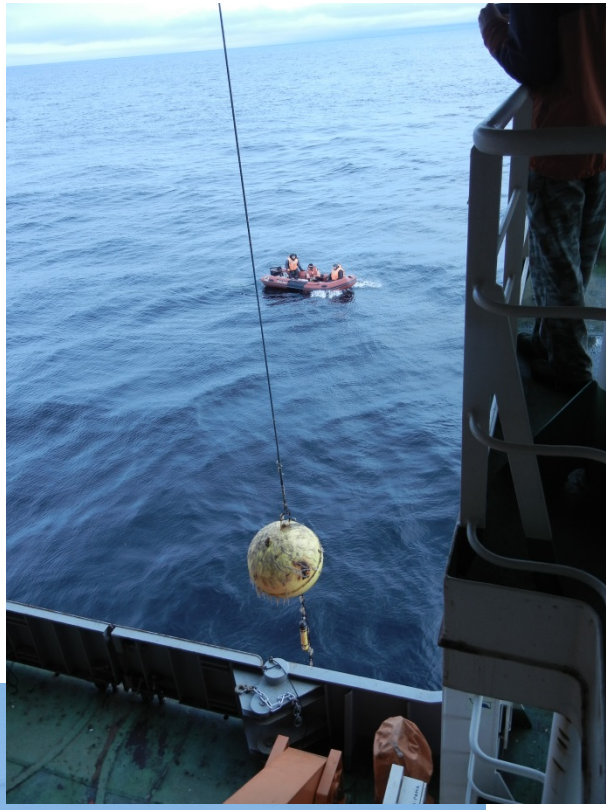
Method: A combination of multidisciplinary observations using repeated sections, moorings and Lagrangian drifters.

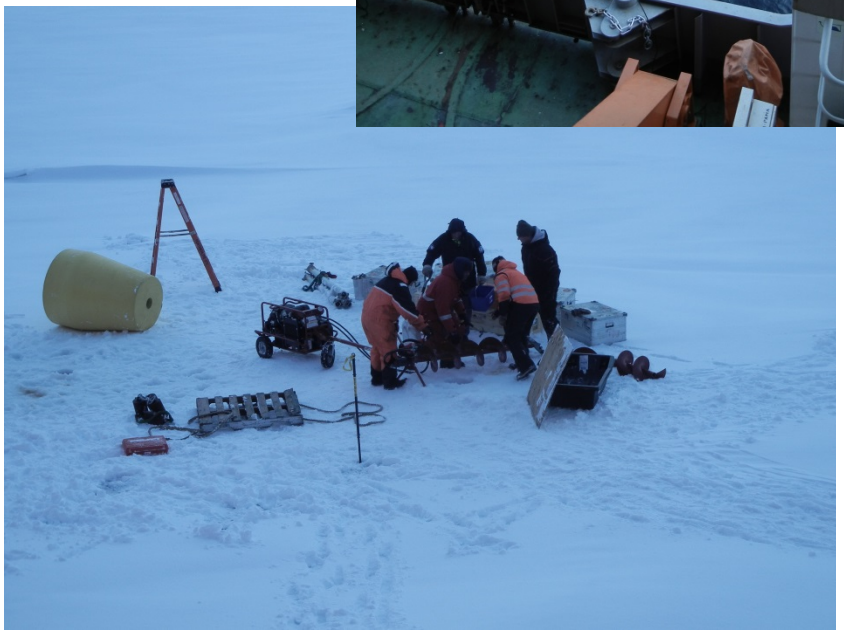
NABOS-2015 cruise track



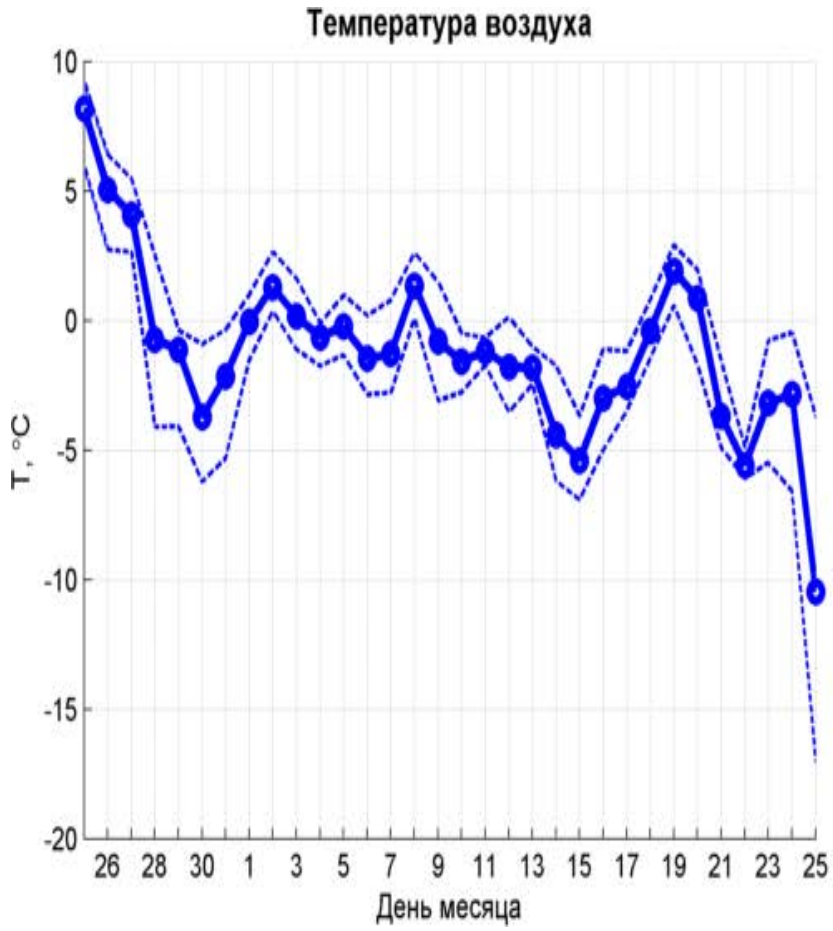
Ice conditions during the cruise

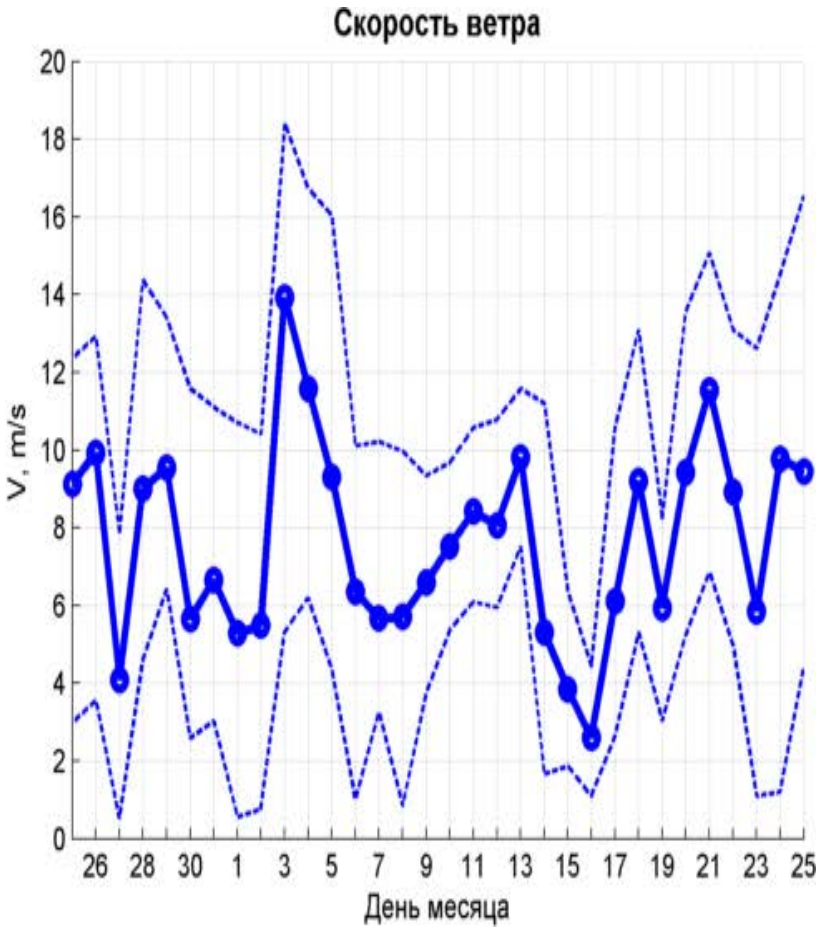




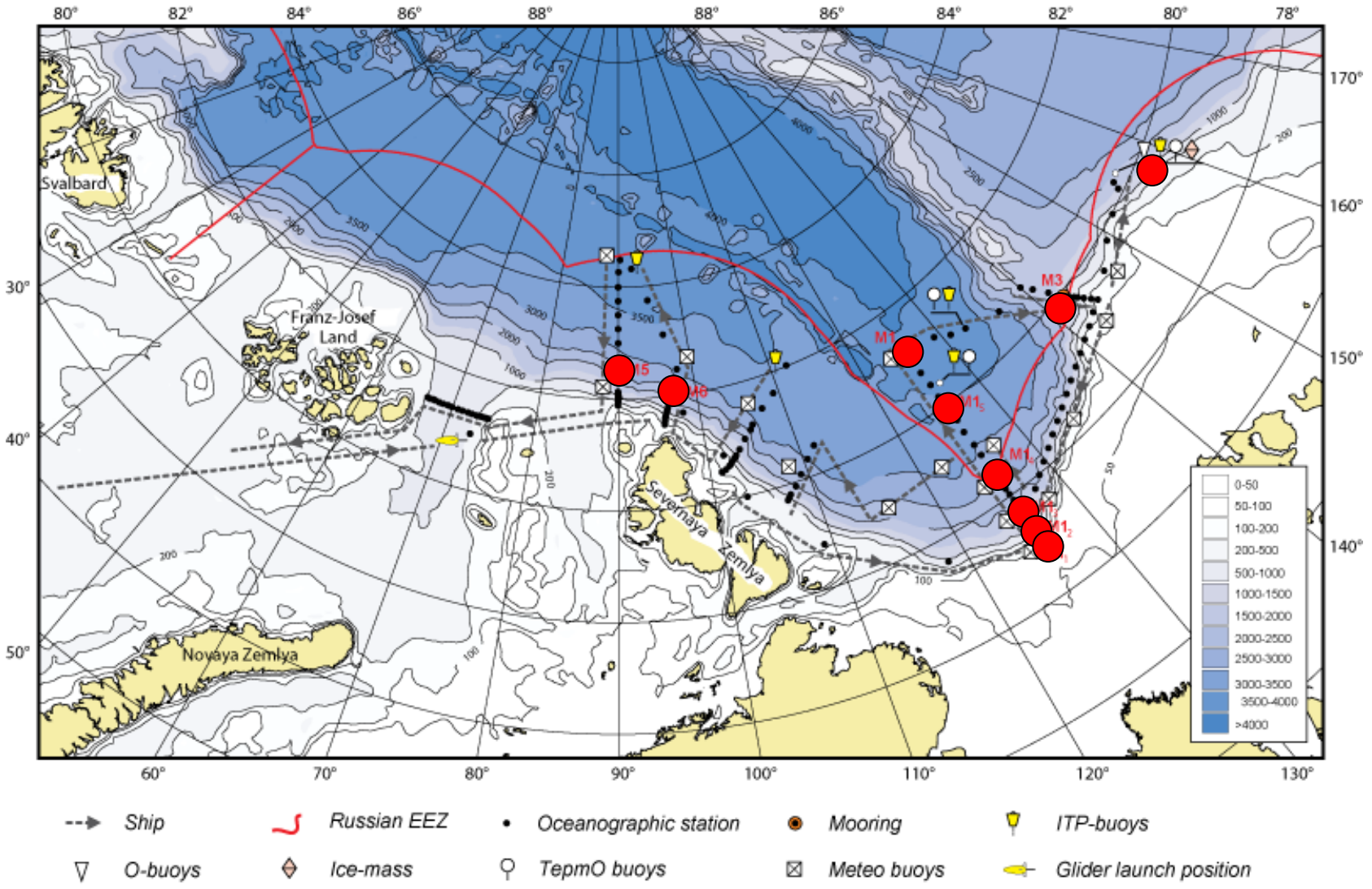


Weather conditions during the cruise



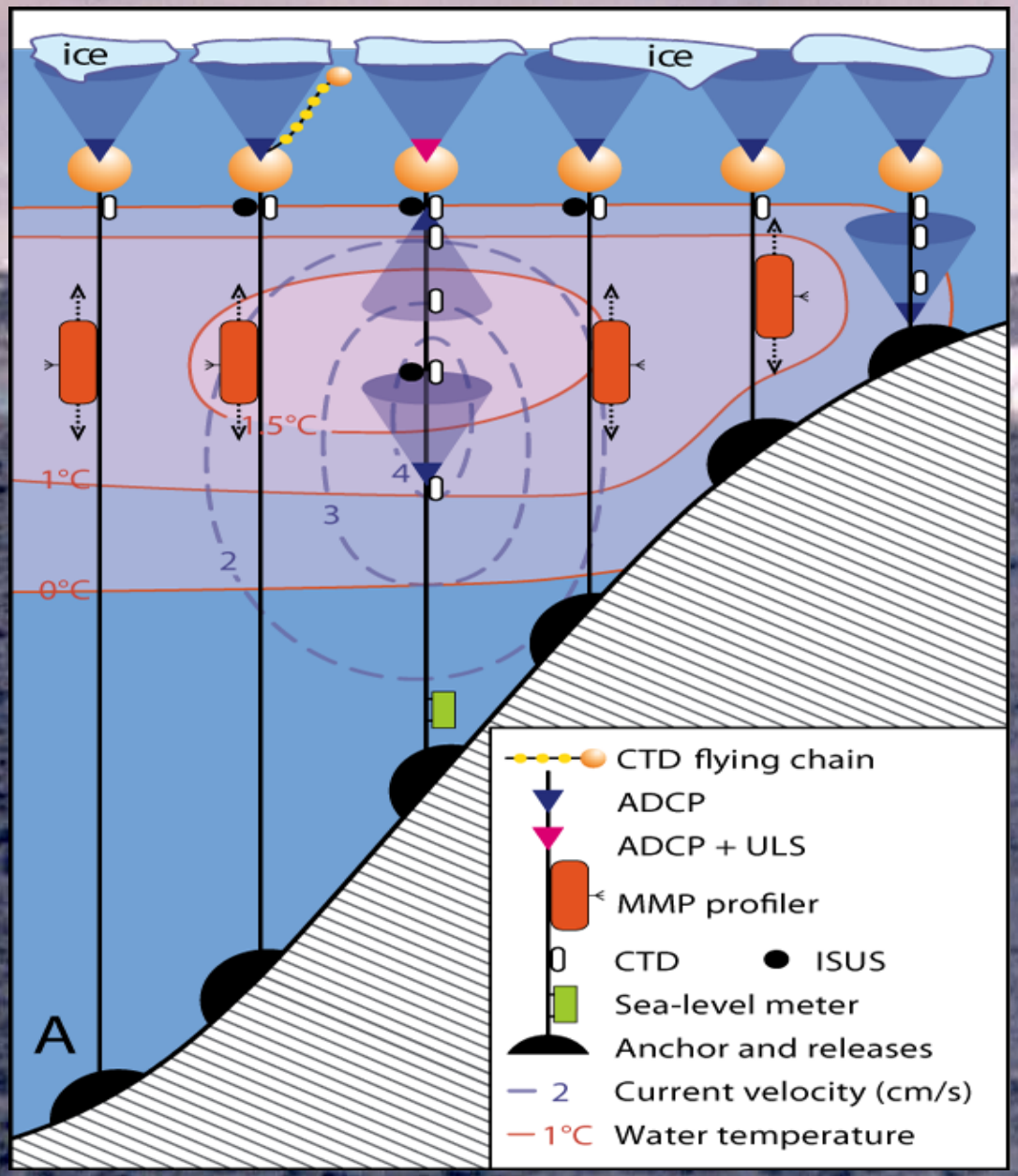


2013 field campaign: Moorings



Mooring-based element of the observational network

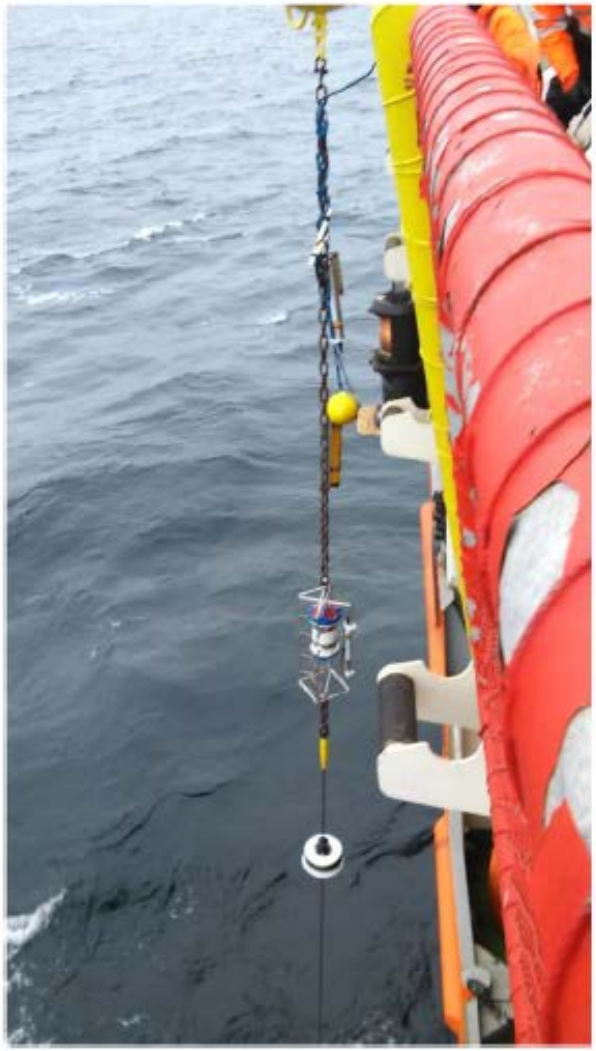
Mooring-based cross-slope section at the central Laptev Sea slope region (~125°E) deployed in 2013.



NABOS 2015: Mooring data recovery

by

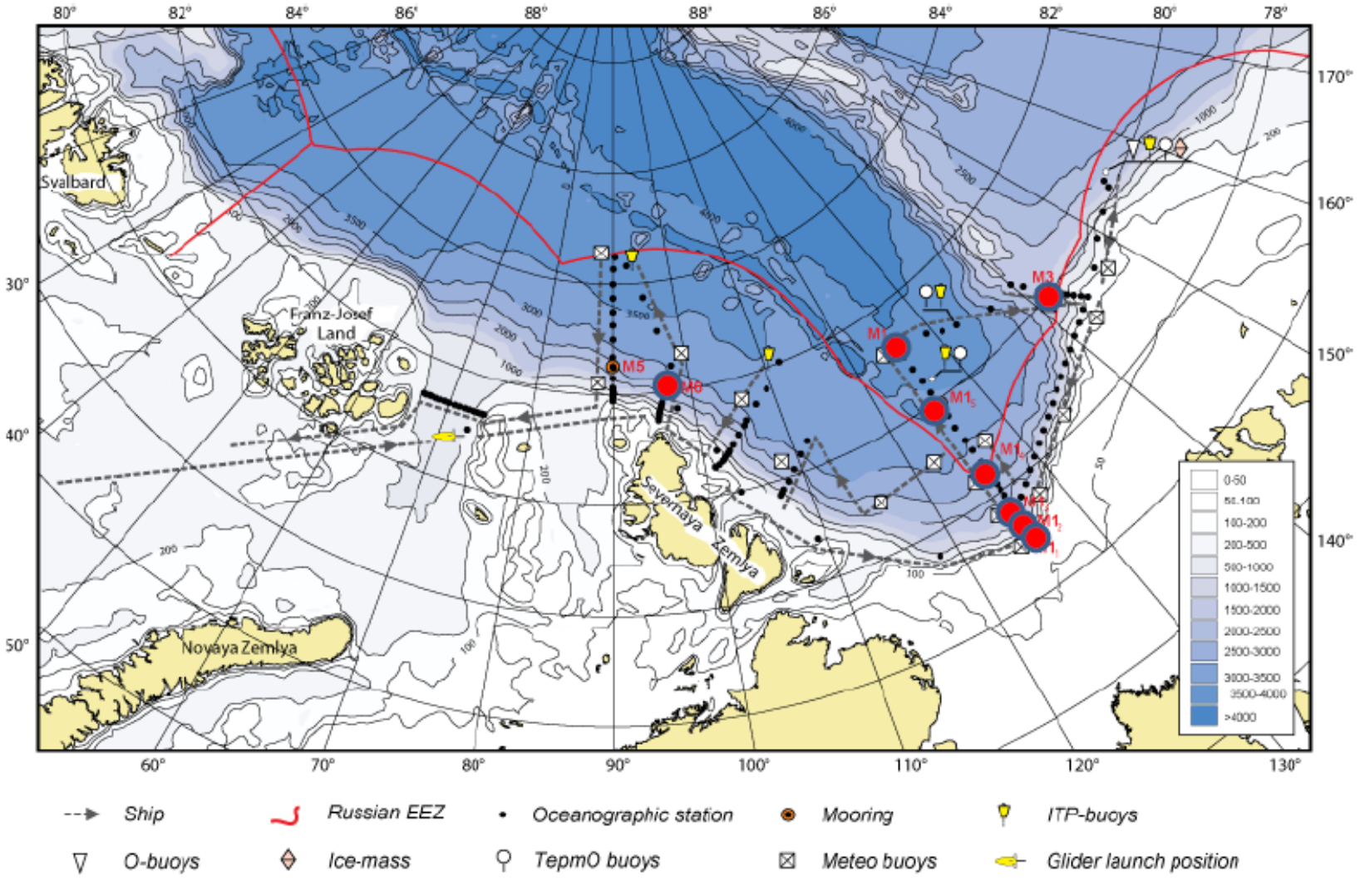
Andrey Pnyushkov and NABOS mooring team



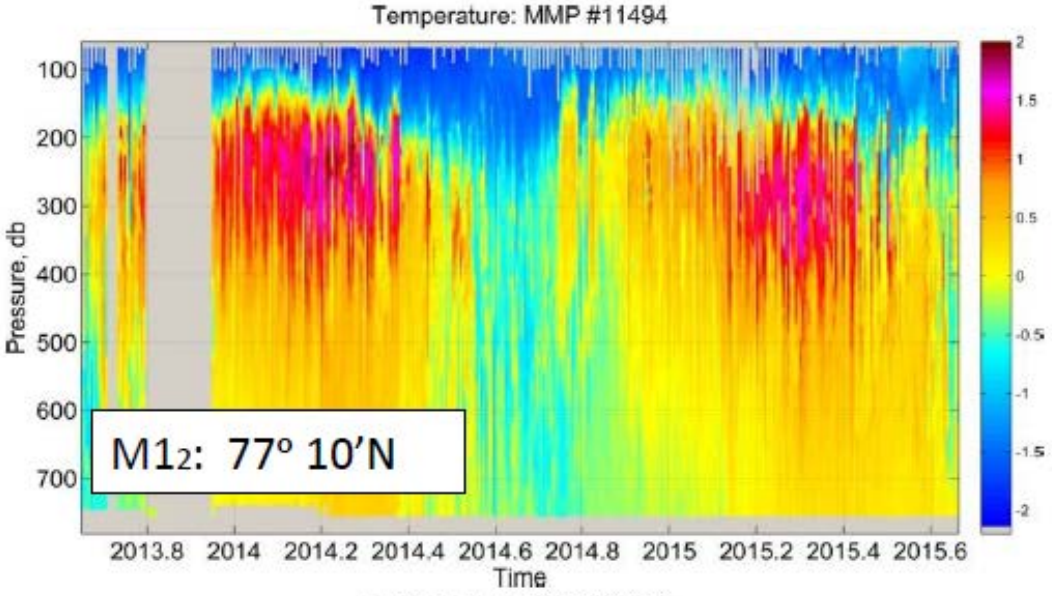
16 October, 2015. Int. Arctic Research Center, Fairbanks, AK

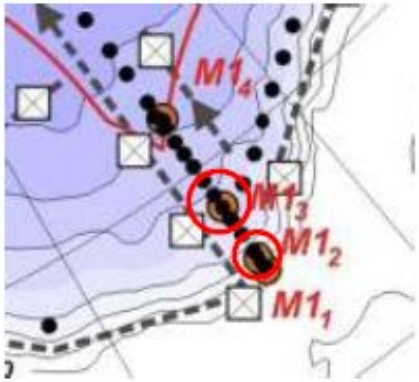
Recovered moorings

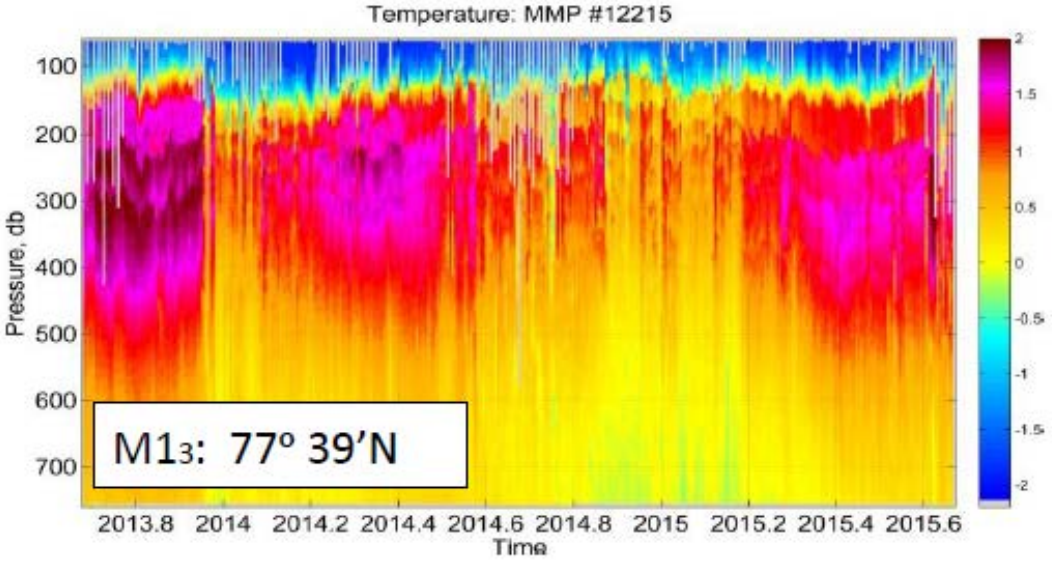
(8 moorings: M6, M11, M12, M13, M14, M15, M16, and M3)



Seasonality of AW temperature





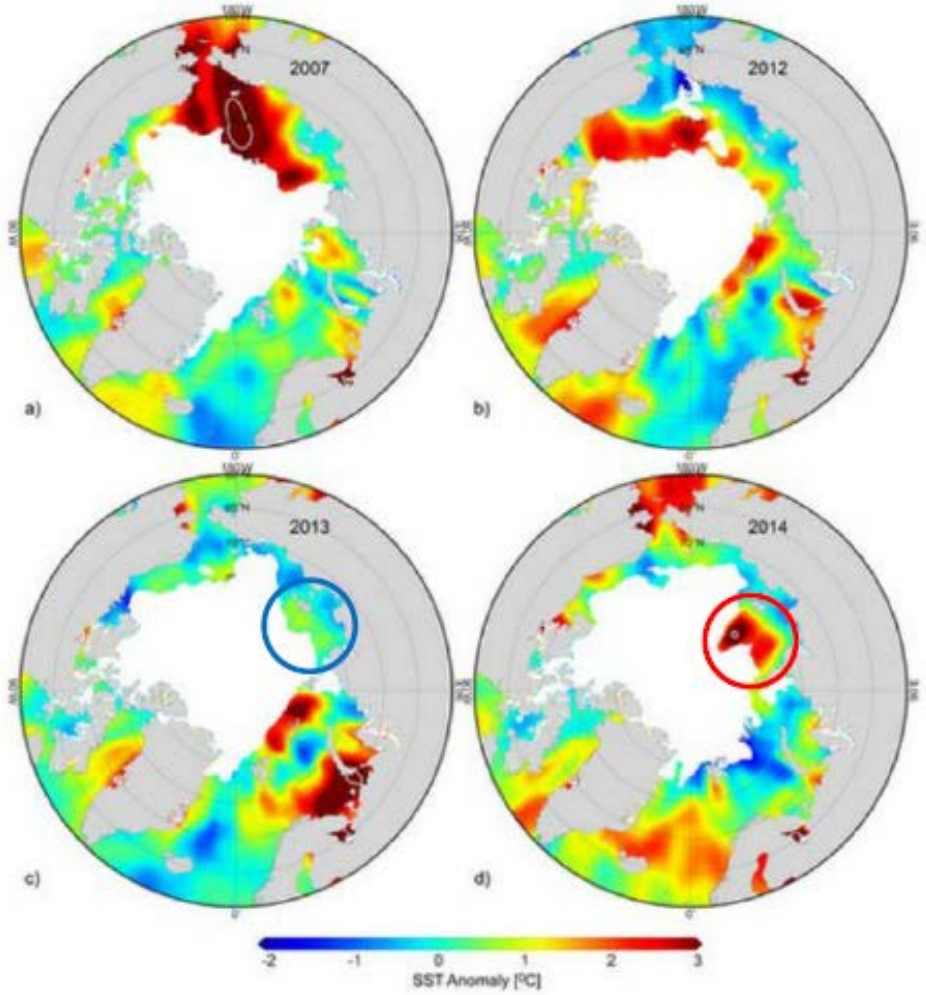


-Strong amplitude of seasonal signal (>2 deg. C)
- Shift in phases
- Cross-slope velocity of signal propagation as high as ~4 cm/s

Some of our moorings have upper ocean CTD chains…

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

Upper ocean temperature anomalies



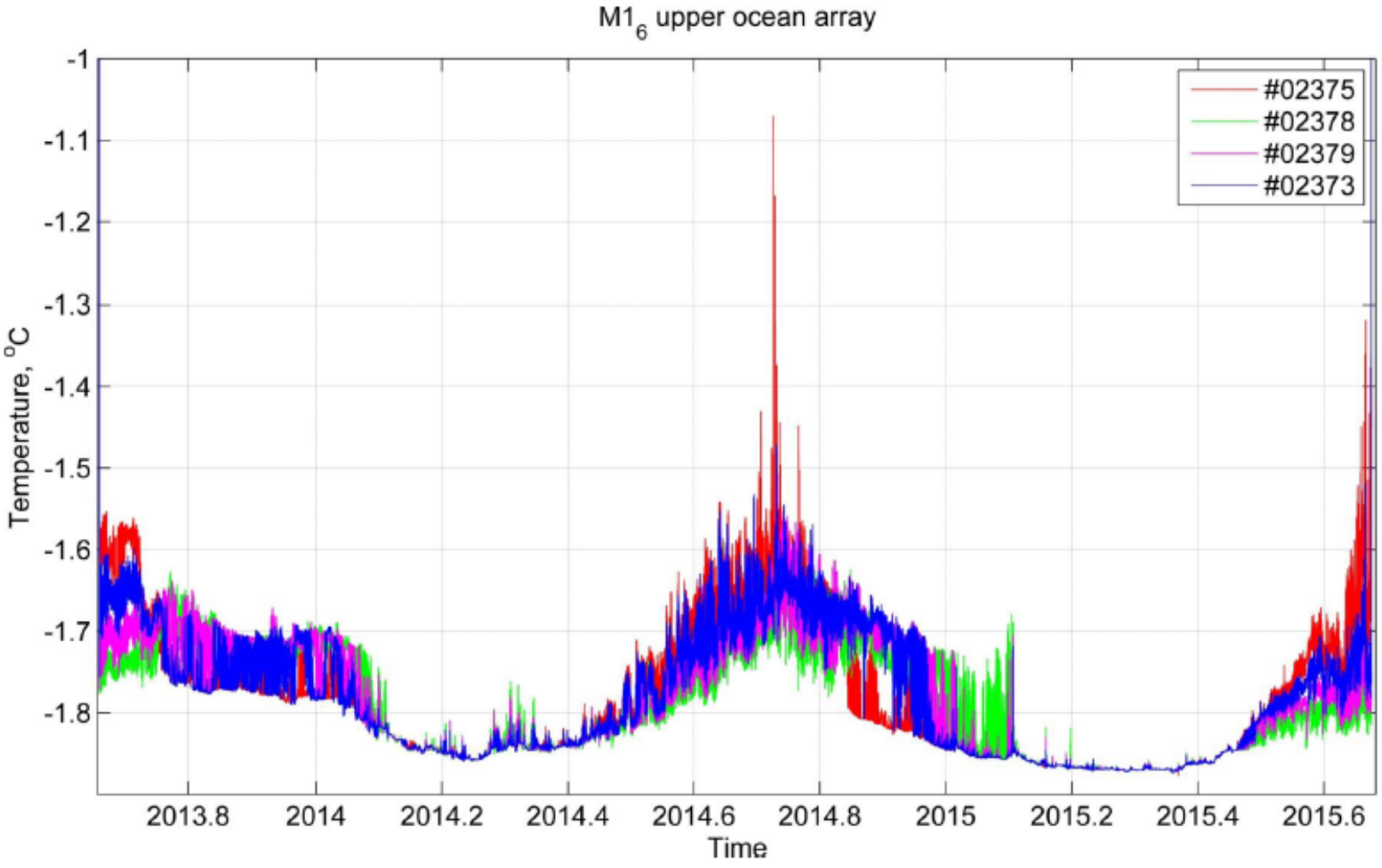
Arctic Report Card, 2014

>3 deg. C anomaly in 2014 in the eastern EB

Fig. 5.2. SST anomalies [°C] in (a) August 2007, (b) August 2012, (c) August 2013, and (d) August 2014 relative to the August mean for the period 1982-2010. White shading in each panel indicates August-average sea-ice extent for each year. Grey contours indicate the 4°C isotherm.

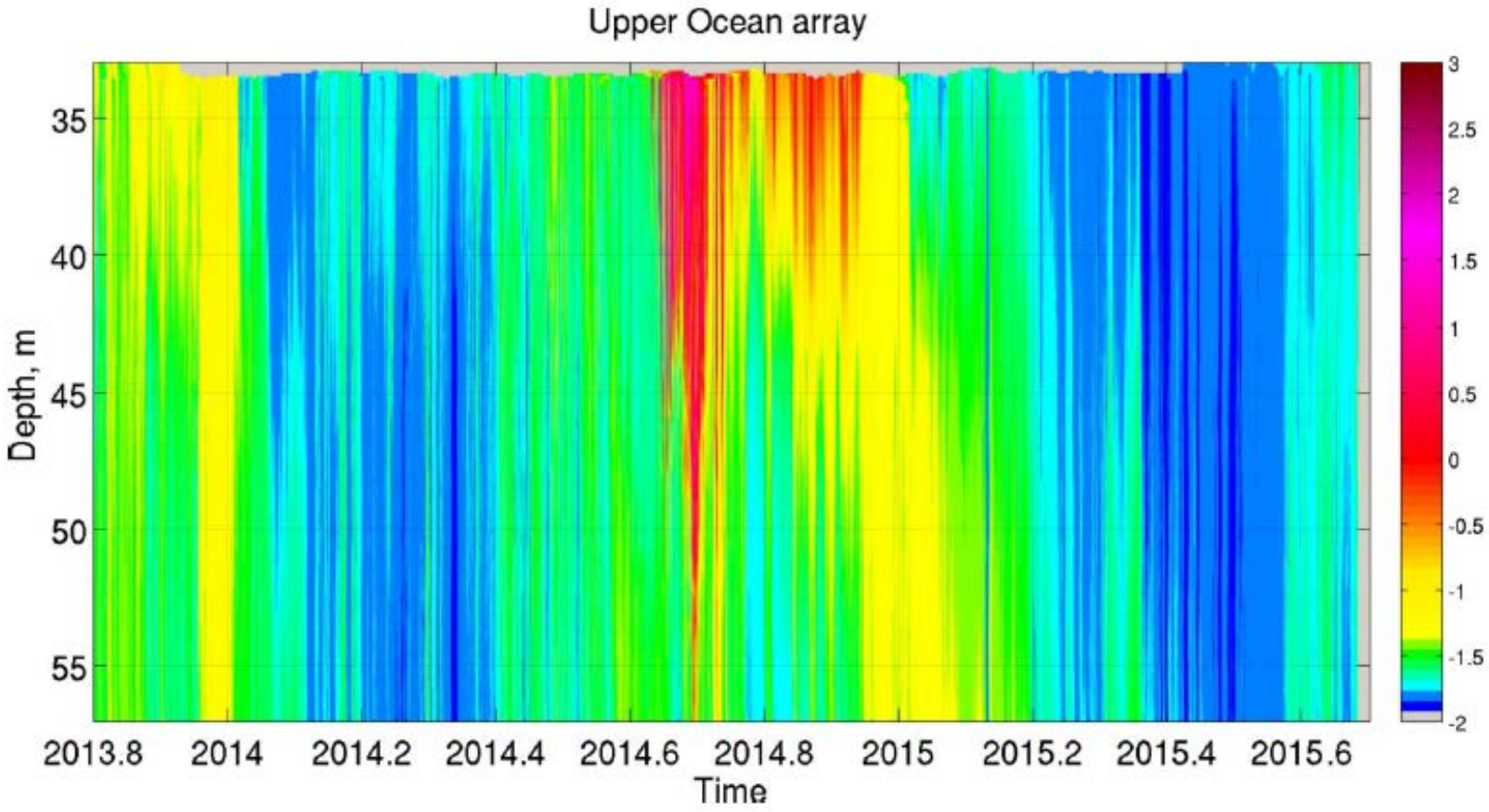
Upper ocean temperature anomalies

2014 temperature anomalies have regional flavor,
likely caused by sea ice distribution

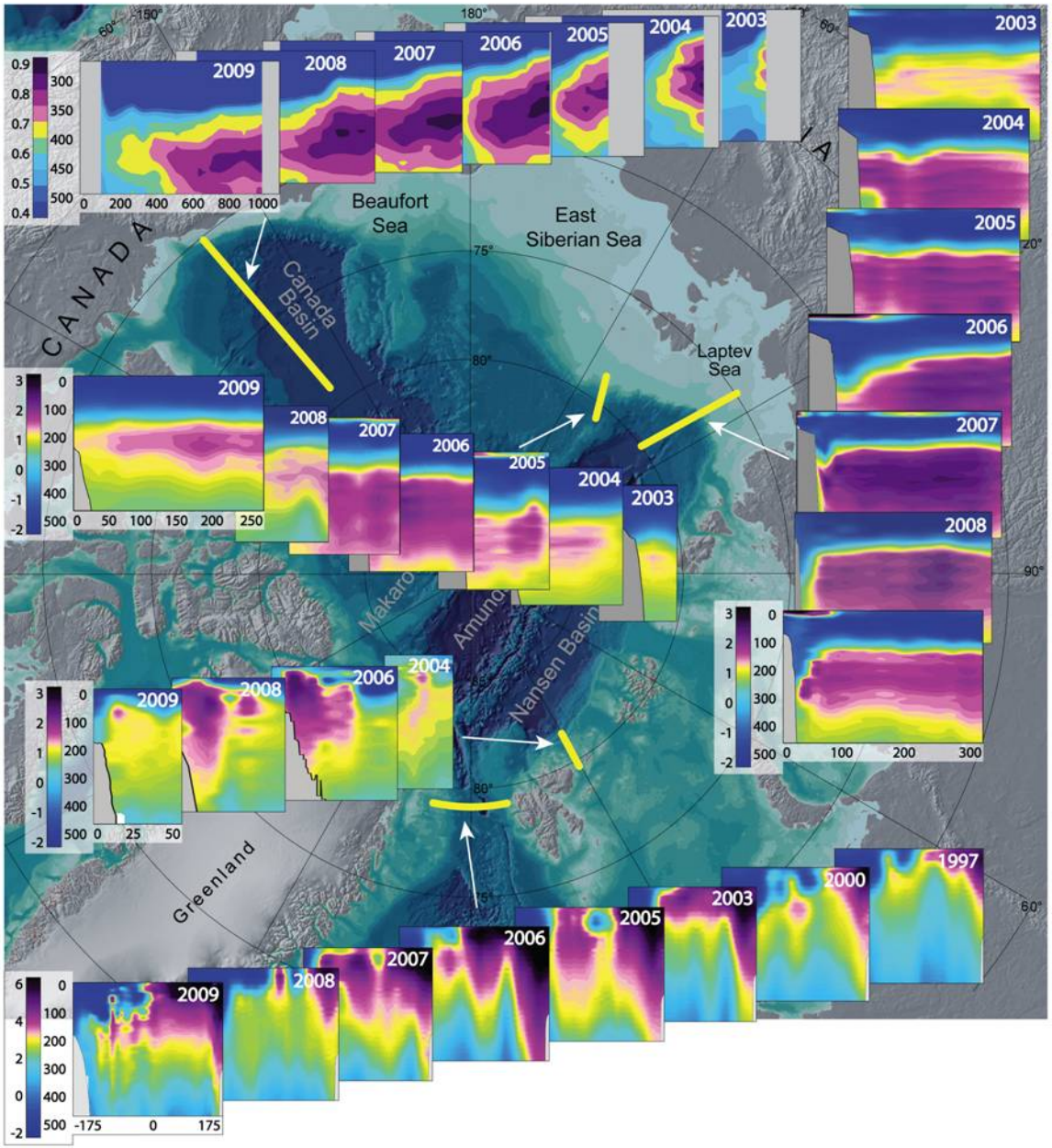


Upper ocean temperature anomalies

High temperatures (>3 deg. C) at M3 mooring in 2014



REPEATED SECTIONS IS A POWERFUL APPROACH

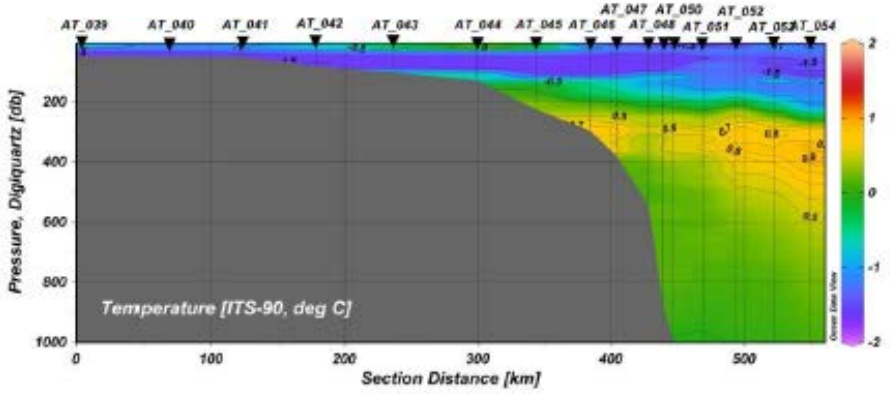


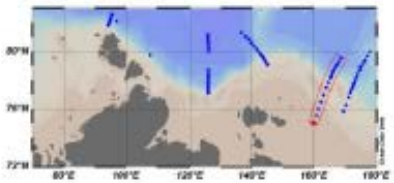
Pulse of warm intermediate Atlantic Water (2000s): 0.24°C warmer than 1990s.

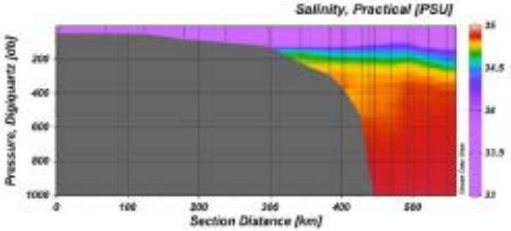
Polyakov et al., 2011

Oceanographic CTD+LADCP observations

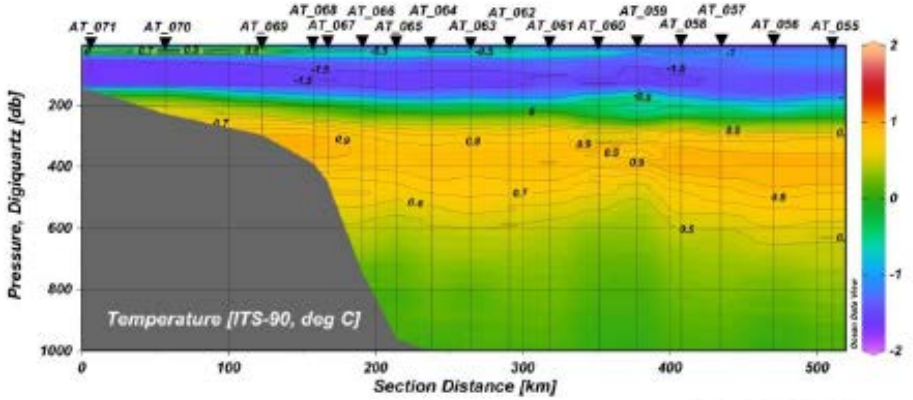
160E Section

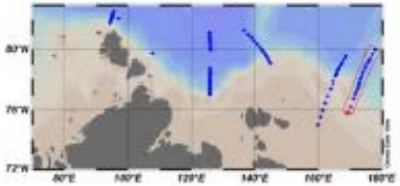


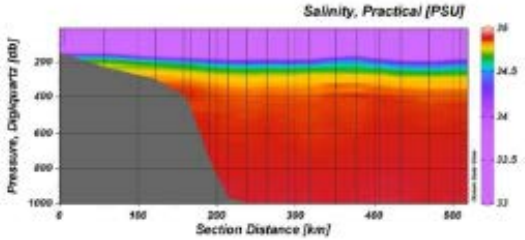




170E Section

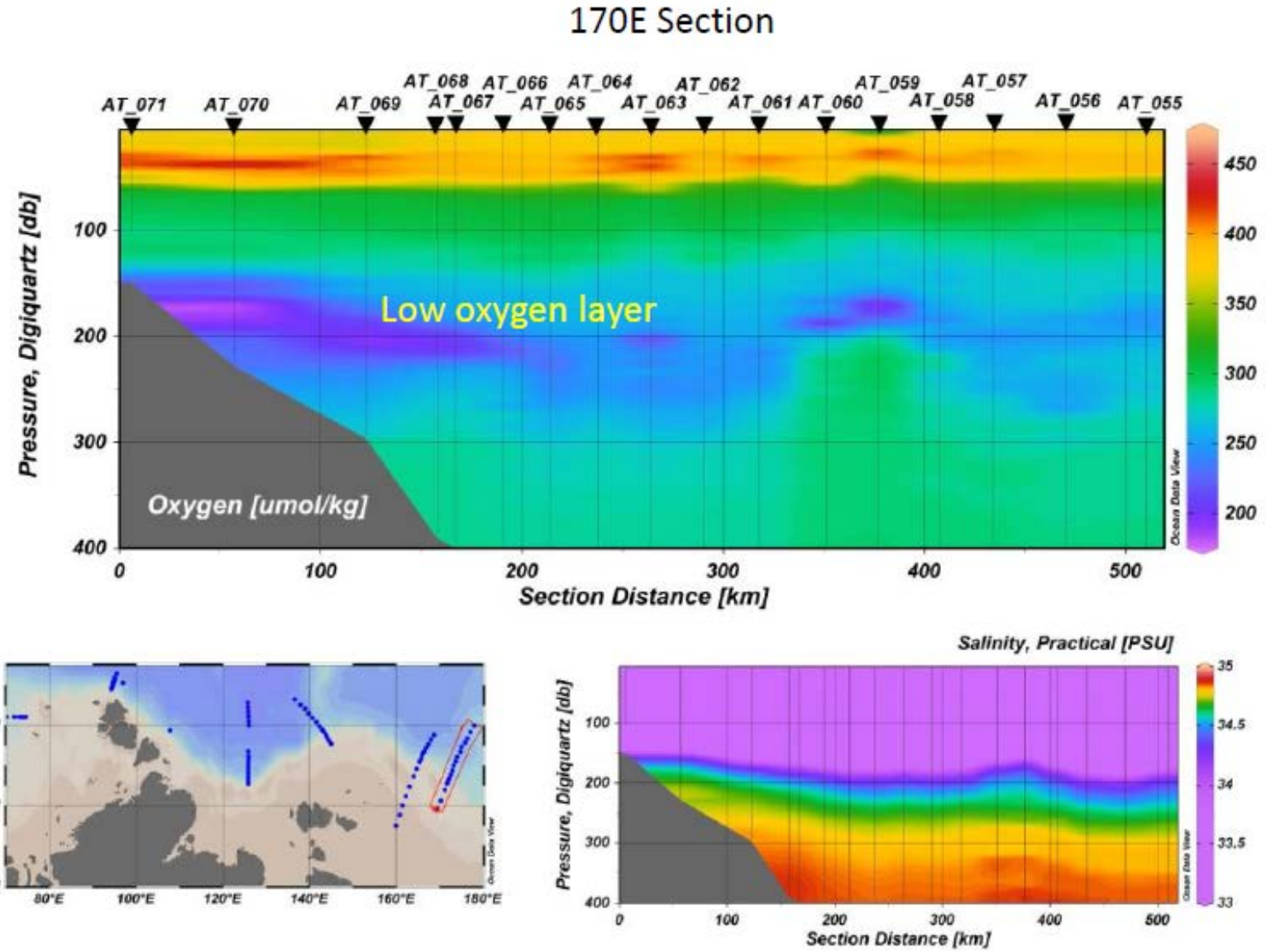






Total: 94 stations at six oceanographic sections

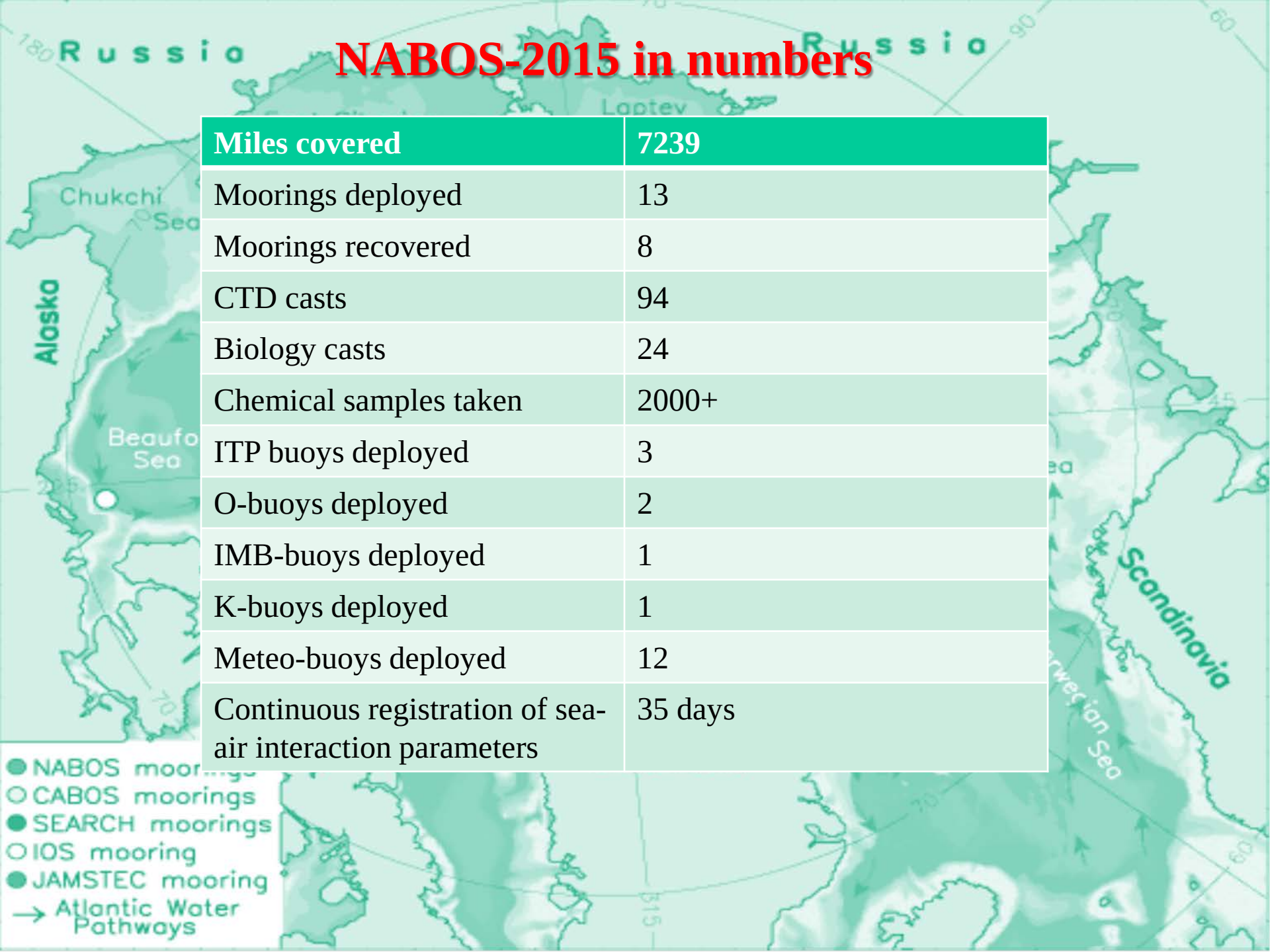
Water masses transformation at ESS slope




Truly international

NABOS-2015 in numbers

Miles covered	7239
Moorings deployed	13
Moorings recovered	8
CTD casts	94
Biology casts	24
Chemical samples taken	2000+
ITP buoys deployed	3
O-buoys deployed	2
IMB-buoys deployed	1
K-buoys deployed	1
Meteo-buoys deployed	12
Continuous registration of sea-air interaction parameters	35 days



SUMMARY

- *The work plan of NABOS-2015 cruise onboard R/V “Akademik Tryoshnikov” is successfully accomplished.*
- *Obtained scientific results proved the efficiency of chosen observational strategy, based on a combination of autonomous anchored moorings and adjoining CTD transects.*
- *In line with the tradition of NABOS project, the cruise joined scientists from various countries/institutes, making the research program truly international and multidisciplinary.*
- *The data collected during the cruise, and in particular the two year long records recovered from 8 moorings in the Nansen Basin and in the Laptev Sea provide solid foundation for fundamental scientific research.*

Acknowledgements

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National Science Foundation of the USA

National Oceanic and Atmospheric Administration

Russian Federal Service for Hydrometeorology and Environment Protection