

AON Observations in the Eastern Arctic help to understand the current state of the climate system

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Pnyushkov²

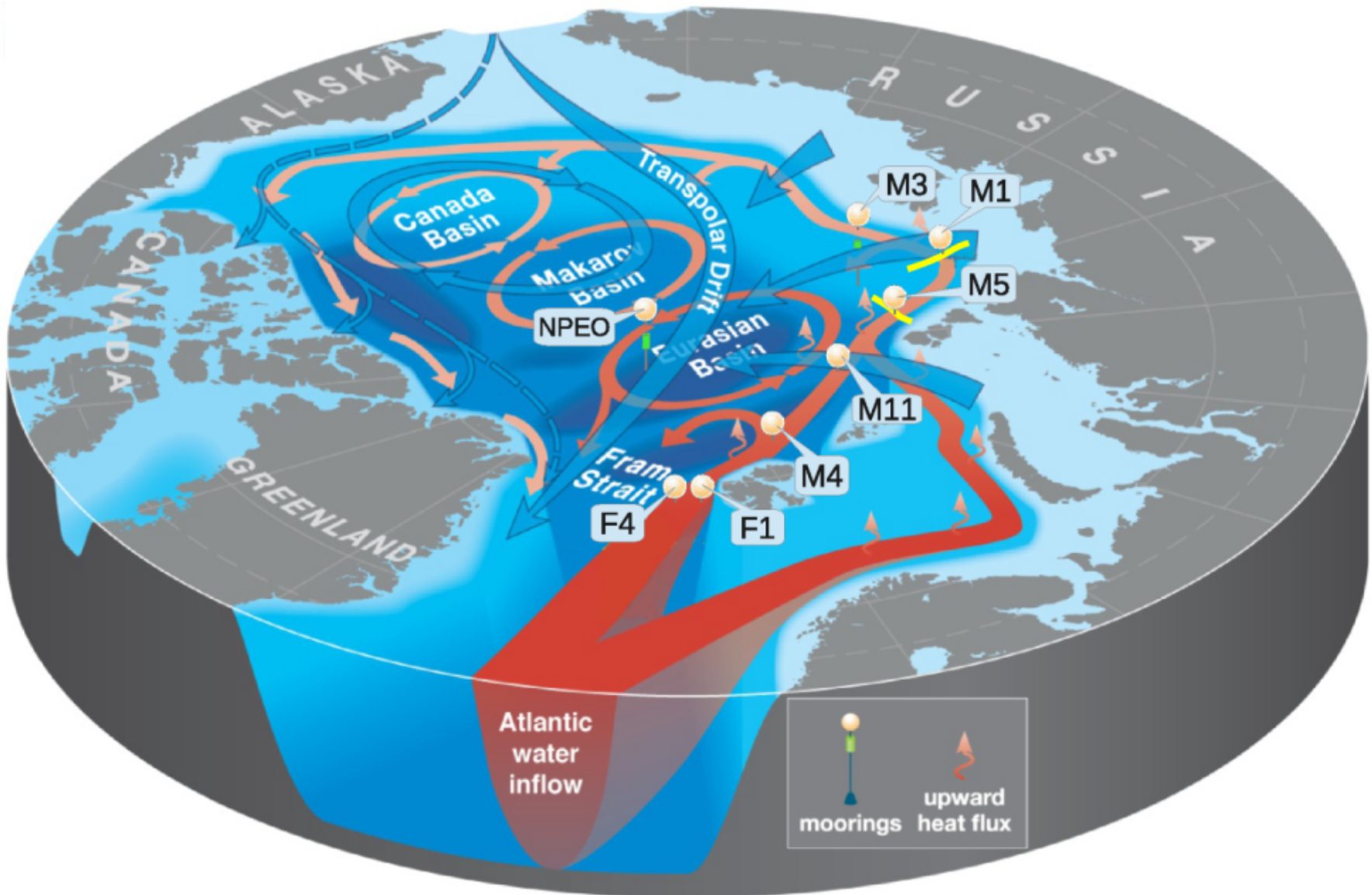


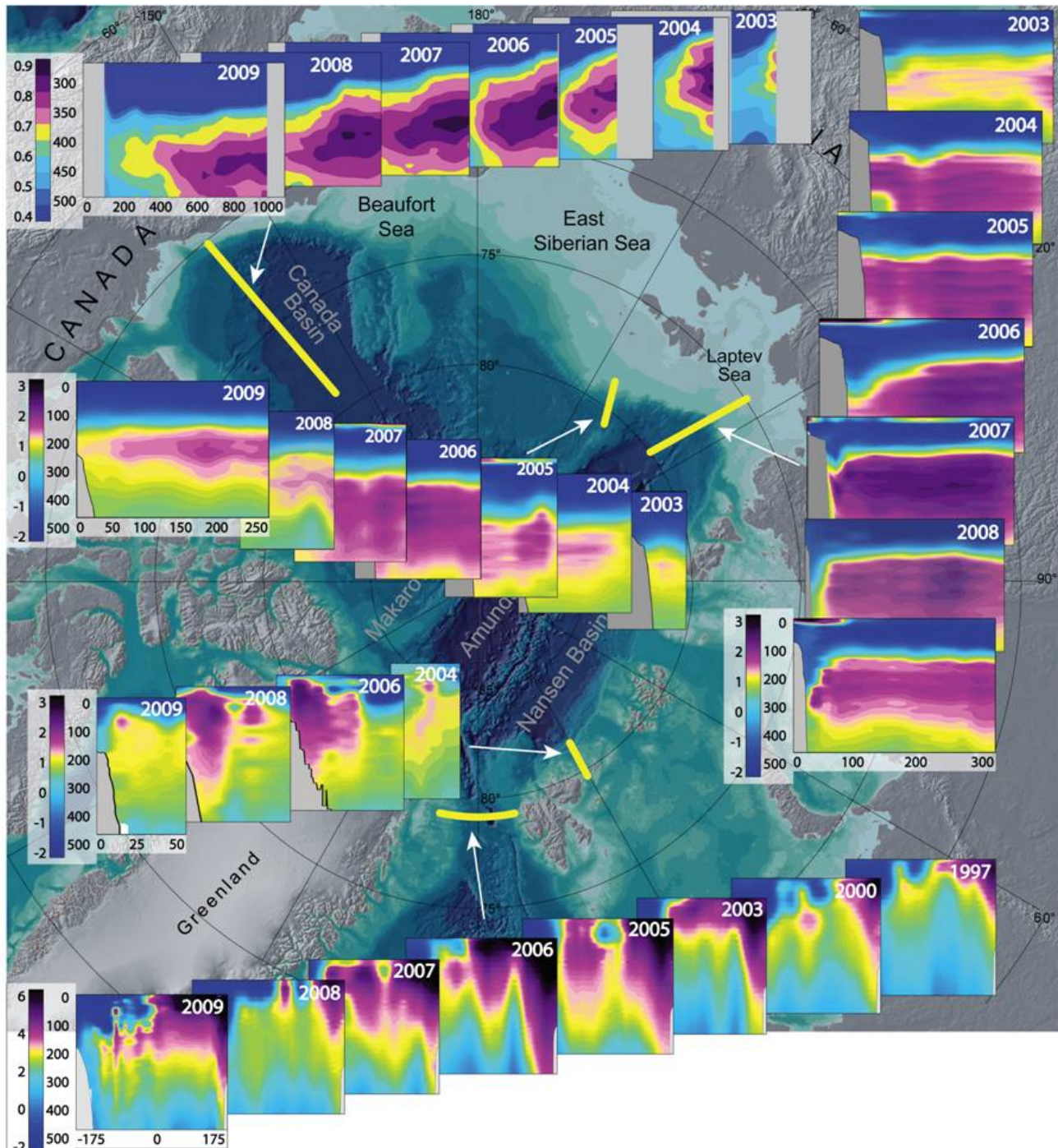
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²International Arctic Research Center, UAF

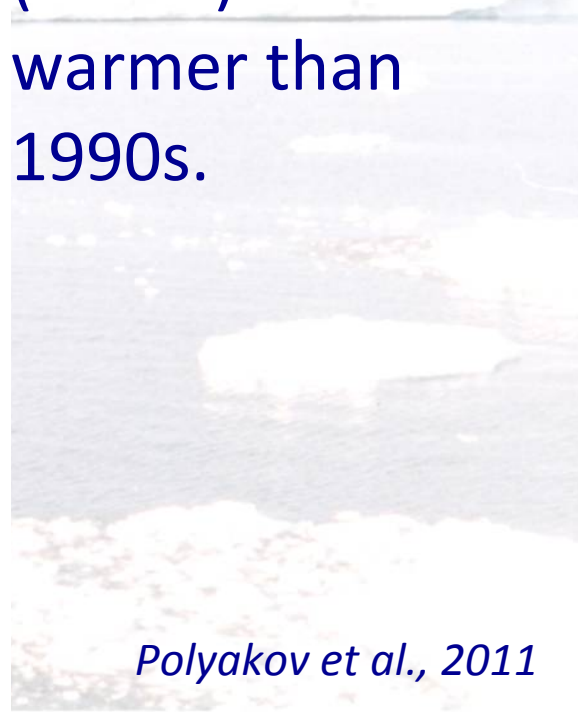
³Arctic and Antarctic Research Institute

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



Atlantic Water heat transport (Fram Strait, TW):

(Schauer et. al. 2004)

Inflow:	28-46±5
Outflow:	15-21±5
Net (Q):	~ 19

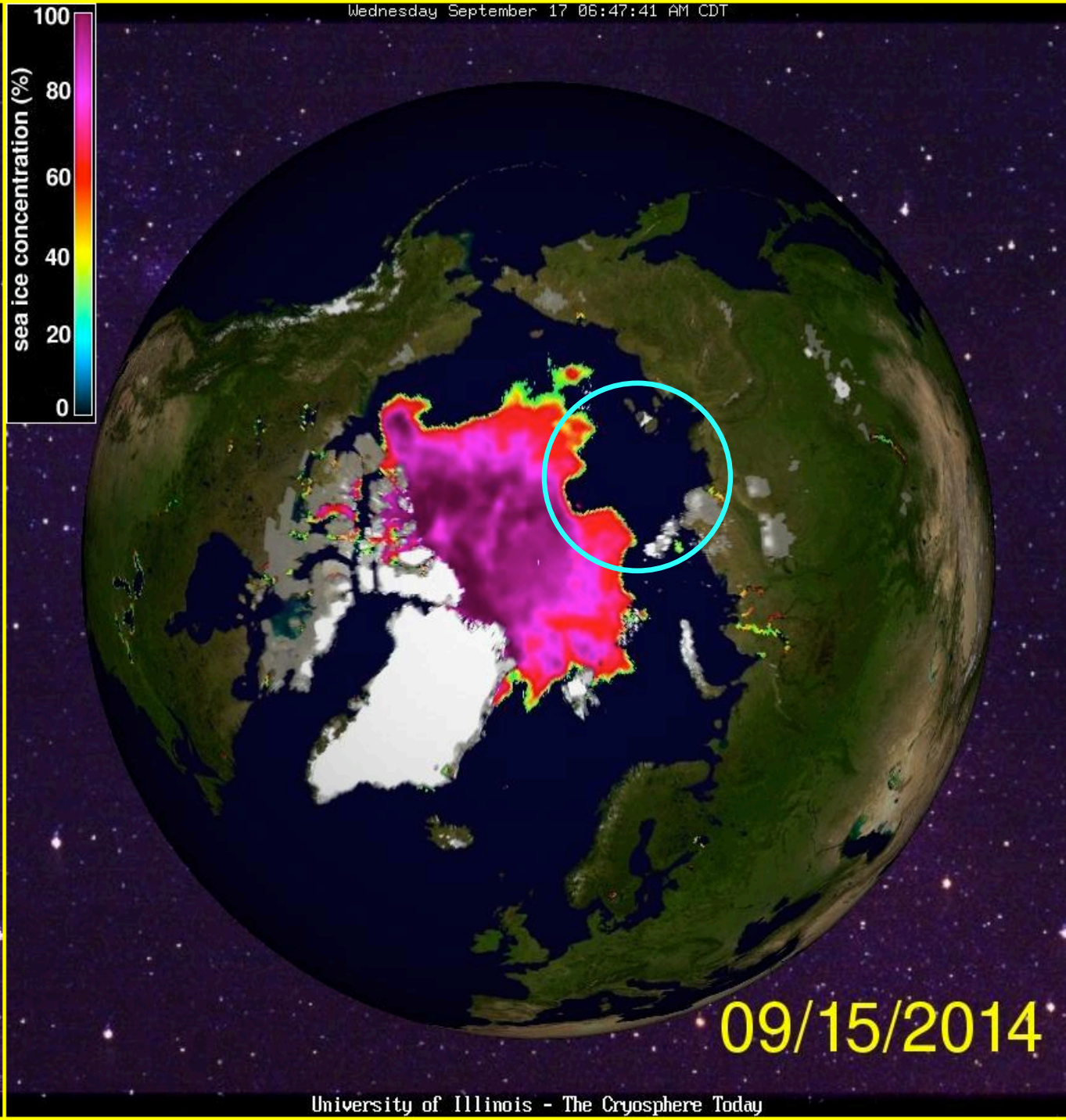
Area of the deep (>200m) Arctic Ocean / Eurasian Basin (km²):

$$S: \sim 5.5 \times 10^6 / 2.4 \times 10^6$$

Vertical heat flux ($F = Q/S$):

$$F: \sim 3.4 / 7.9 \text{ W/m}^2$$

1 W/m² is equivalent to ~10cm of ice thickness loss per year



Recent reductions of sea ice in the eastern Eurasian Basin...

comparable to western Arctic sea ice loss



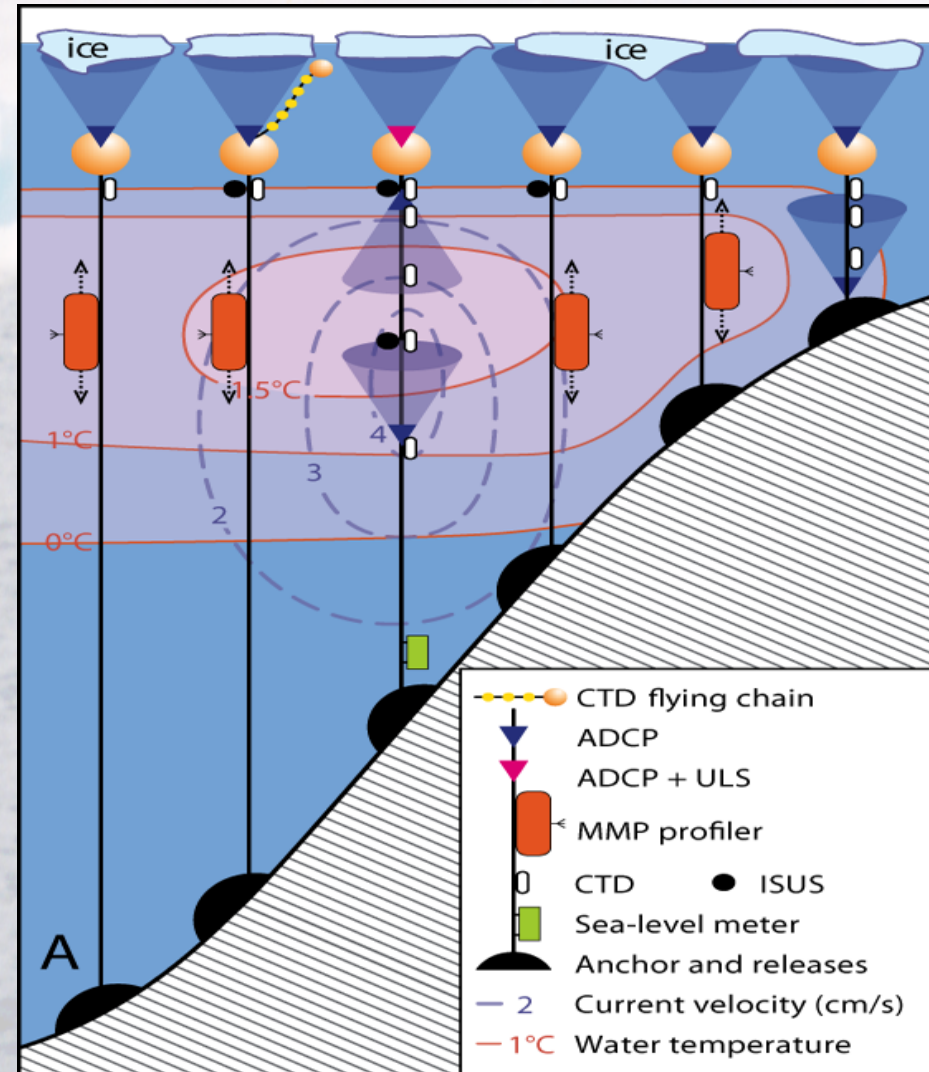
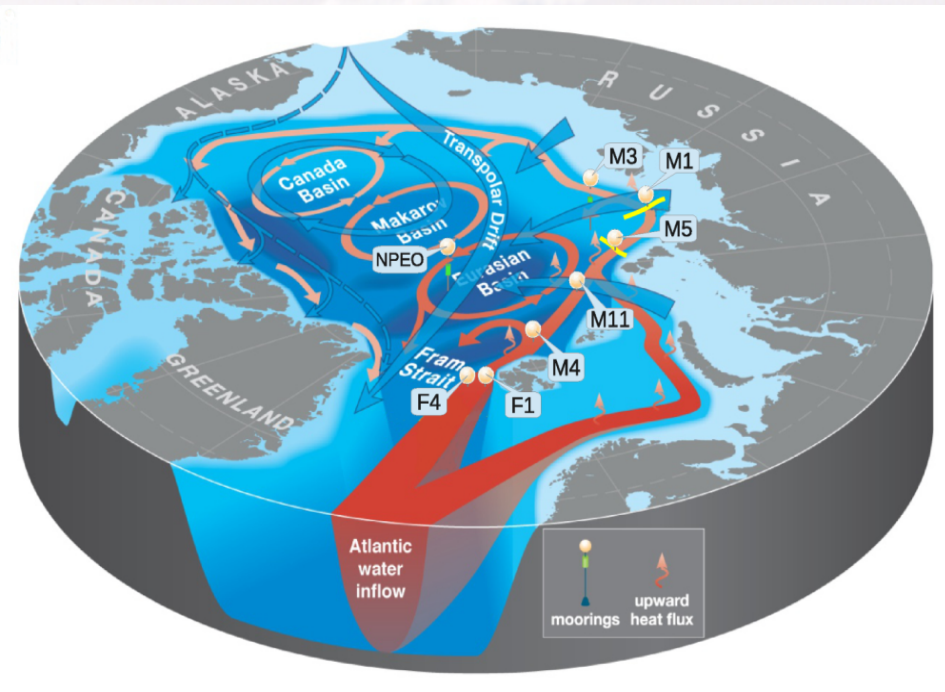
Overarching goal of 2012-2017 study, as an element of the Arctic Observing Network: to compile a cohesive picture of climatic changes in the Eurasian and Makarov basins (EMB) of the Arctic Ocean, with particular focus on understanding three major observational targets:

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.*

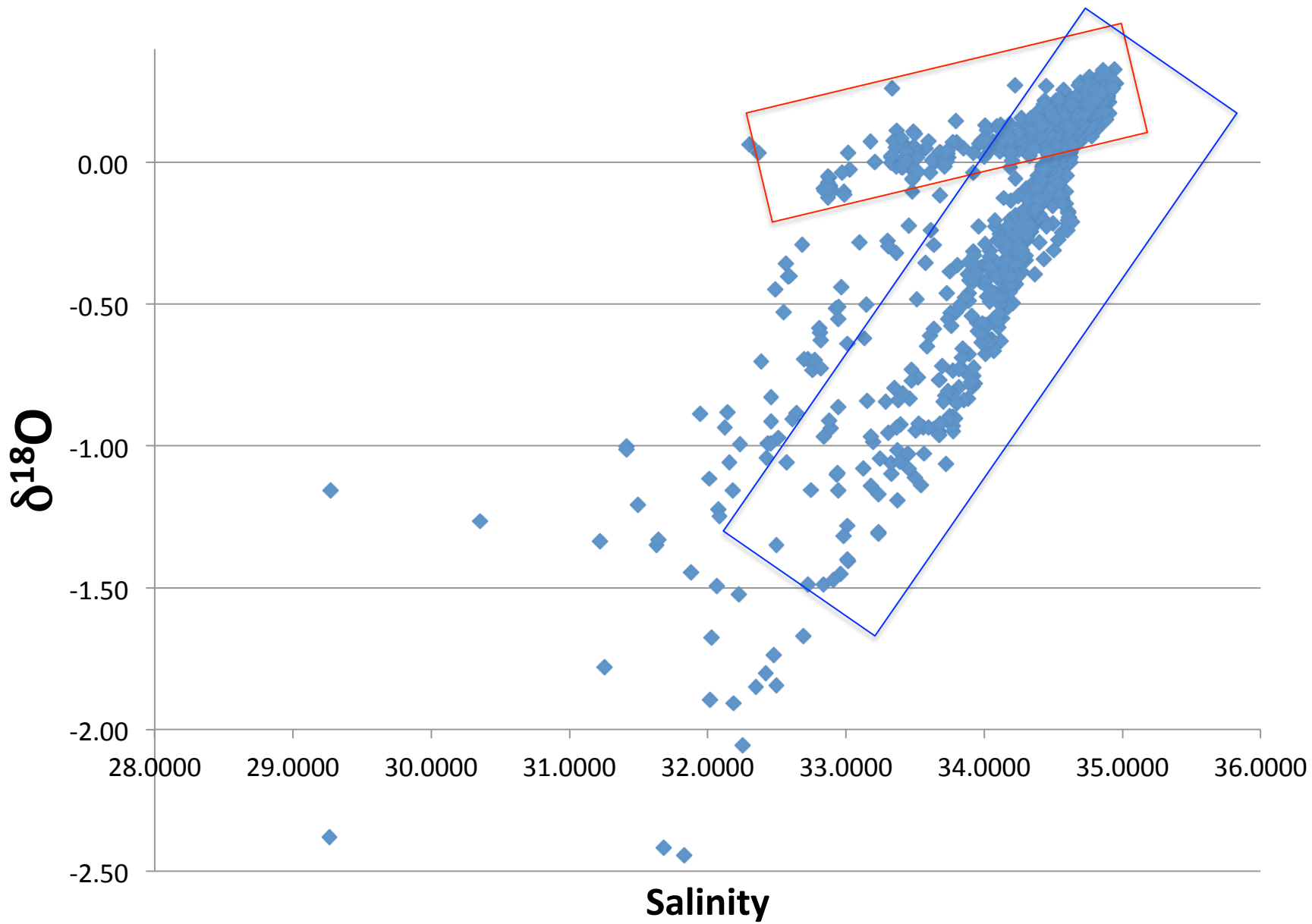
Target #1: *Along-slope Atlantic Water transport by boundary currents*

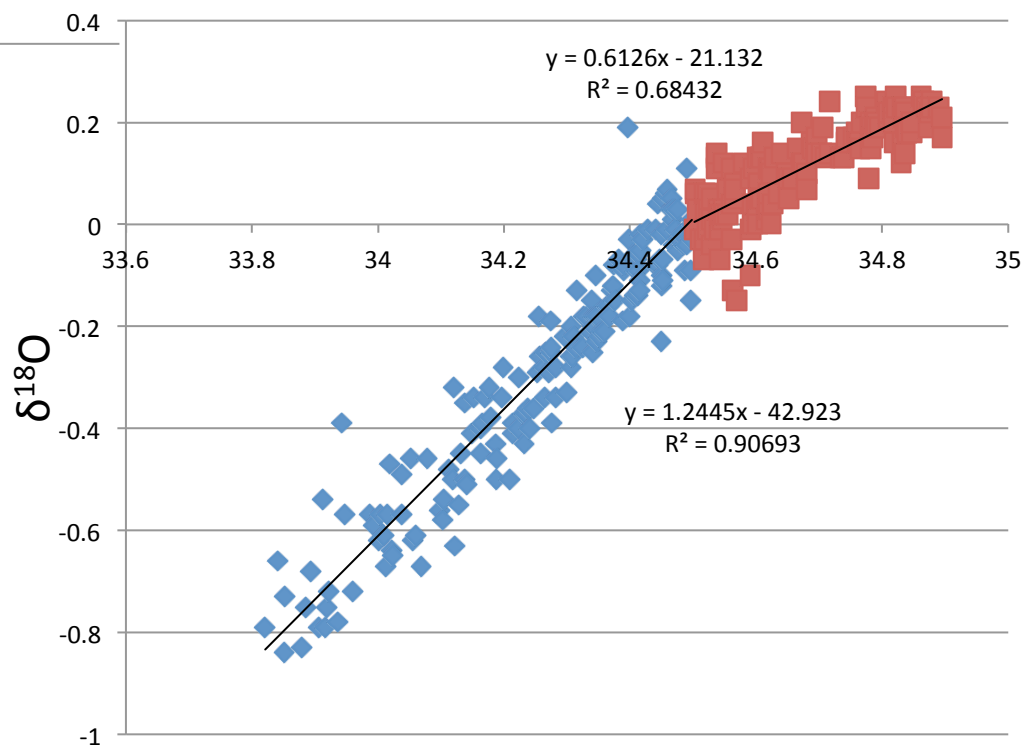
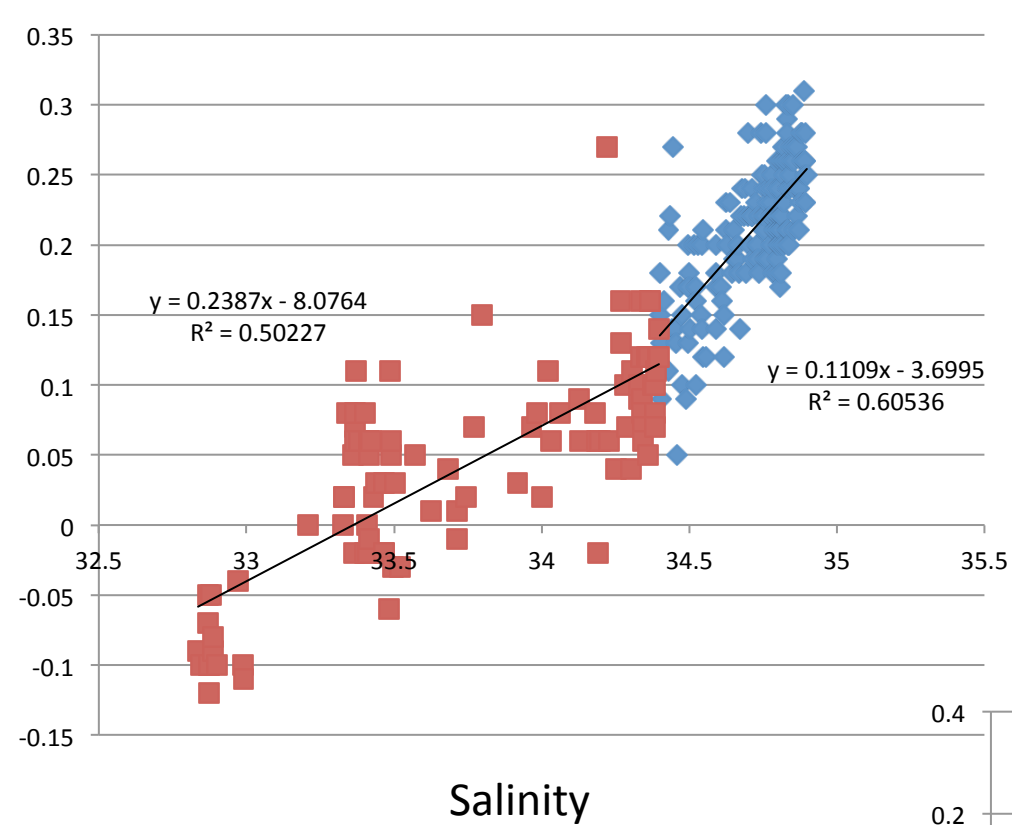


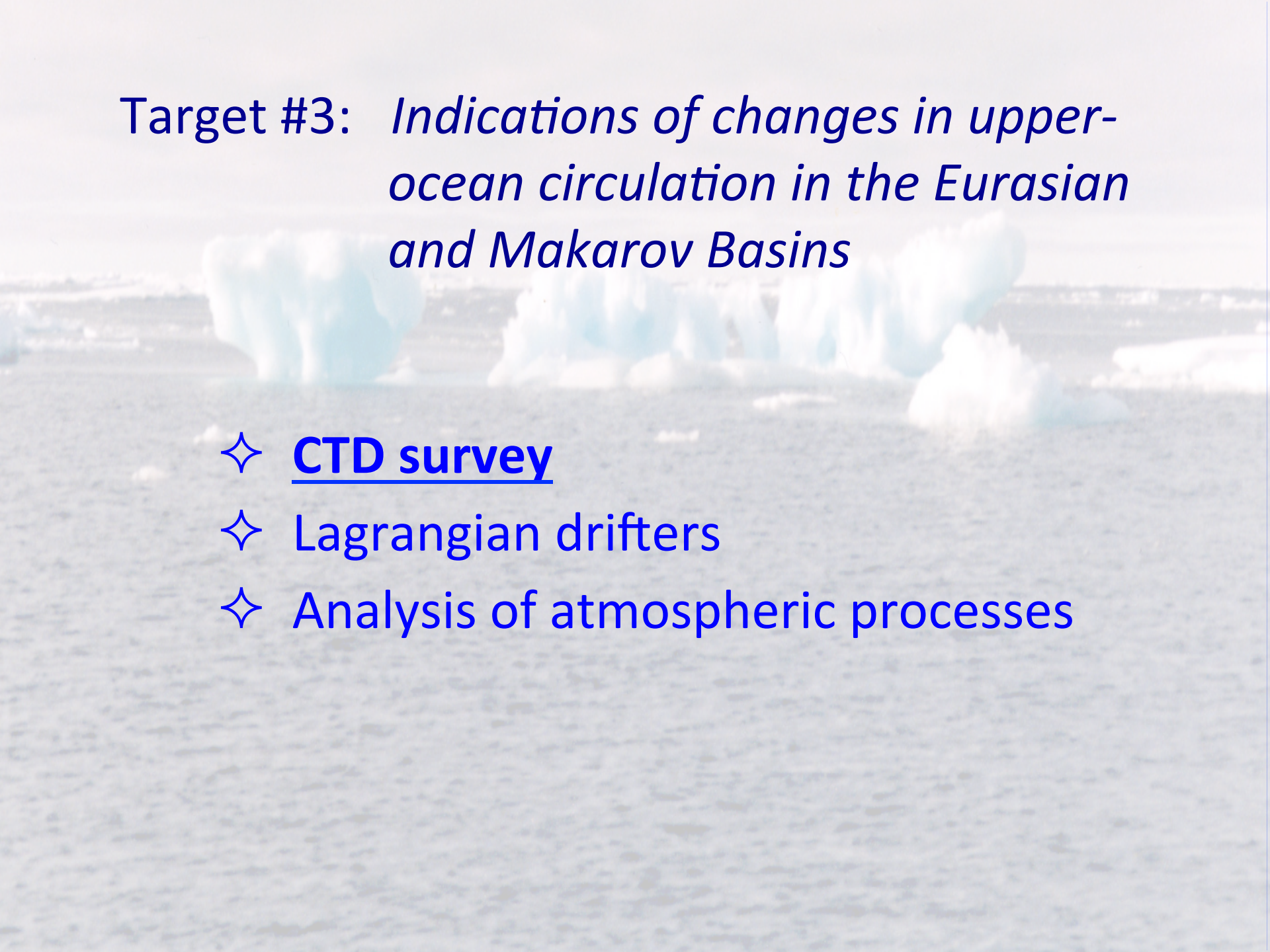
For more info., see
Andrey's talk after
the break!

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

- ✧ **Composition**
- ✧ Dynamics / Variability
- ✧ Interactions



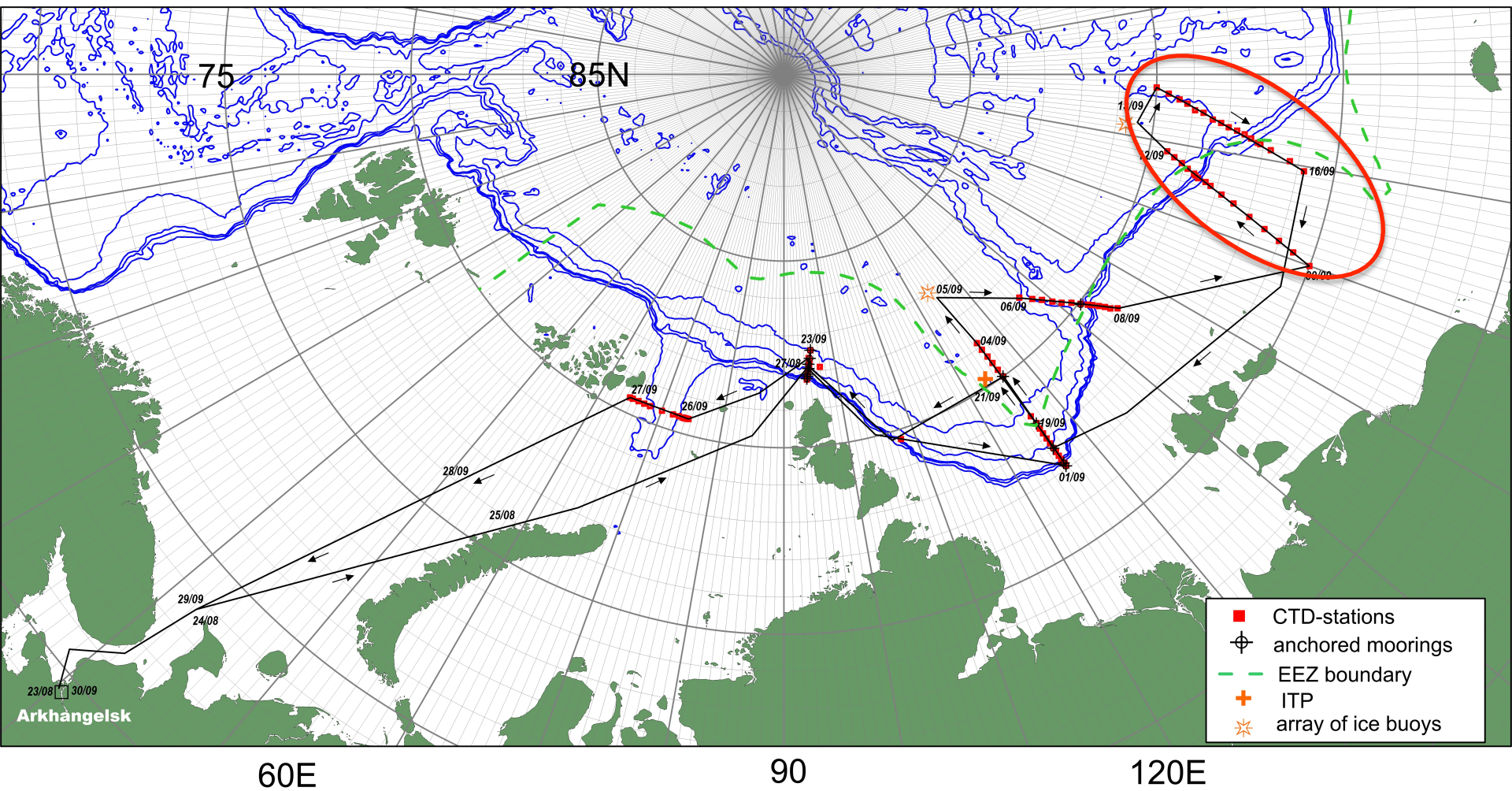


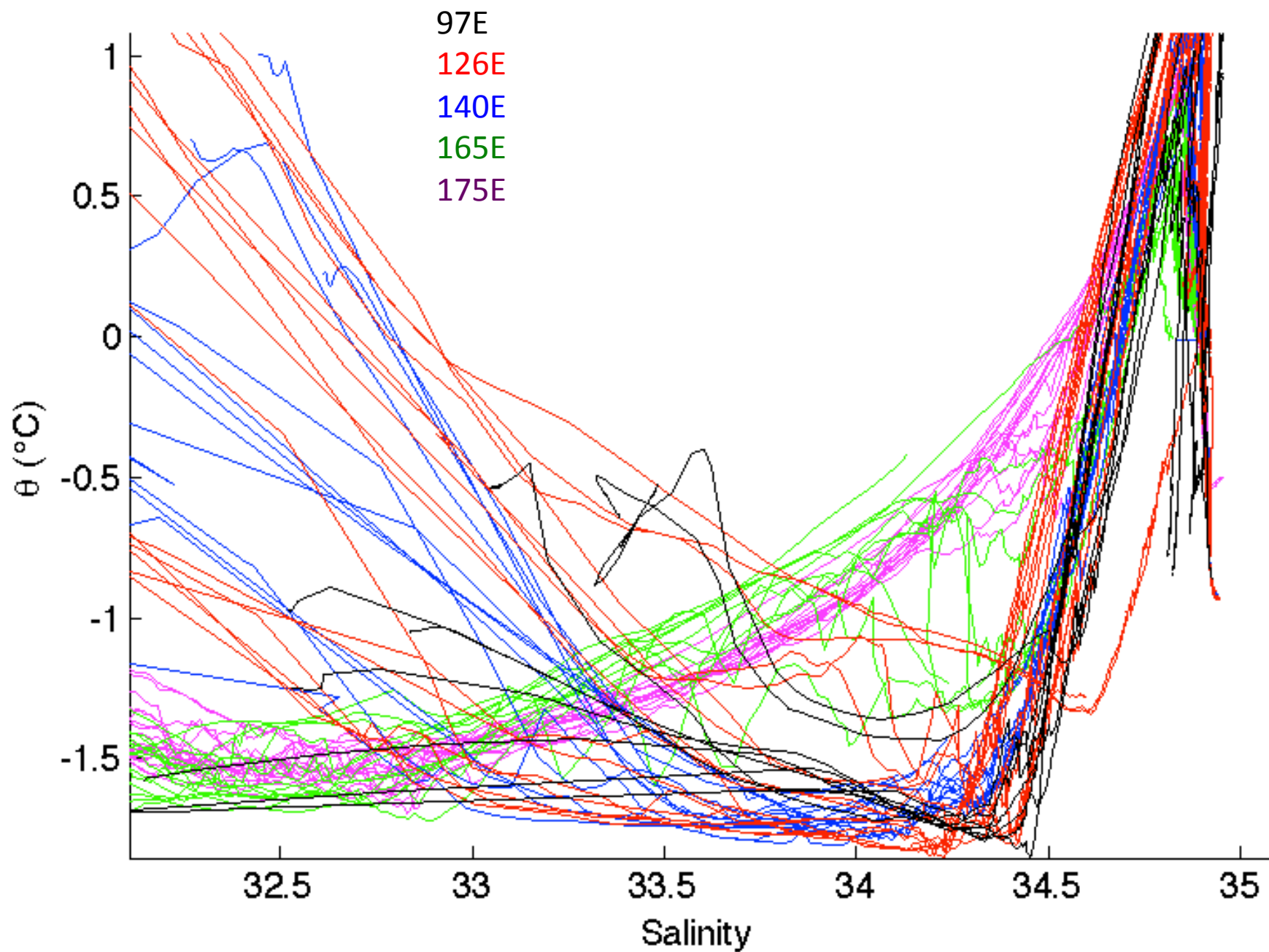


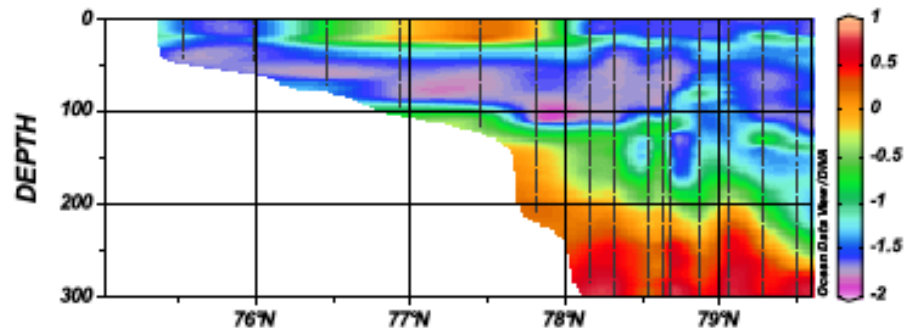
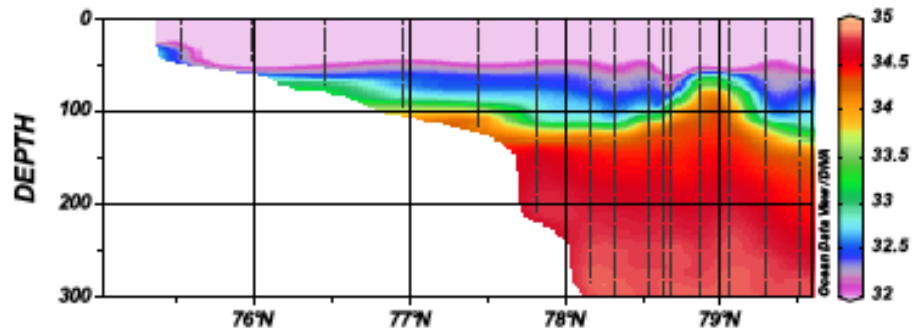
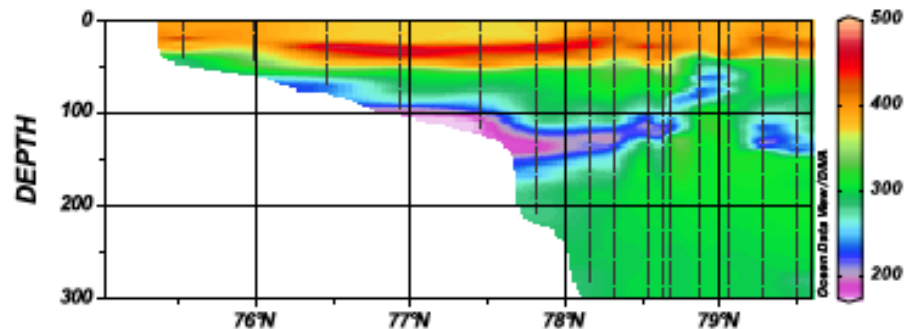
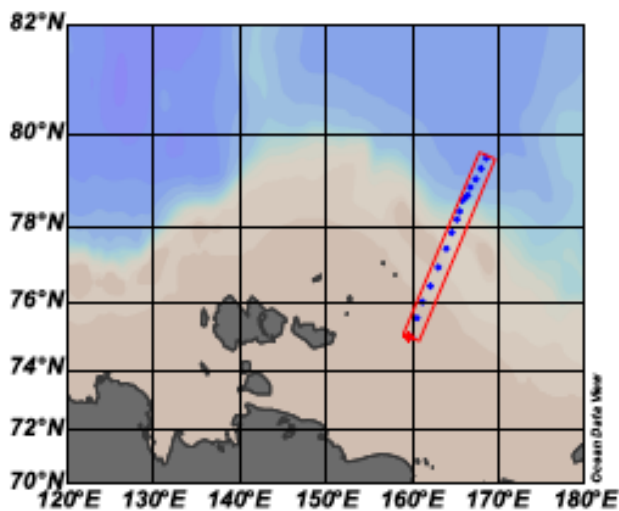
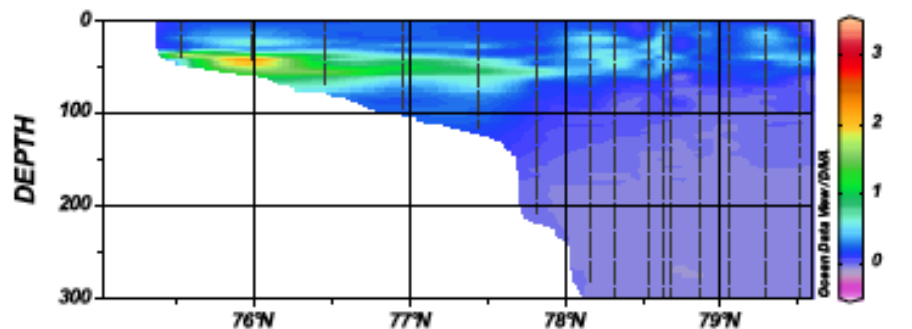
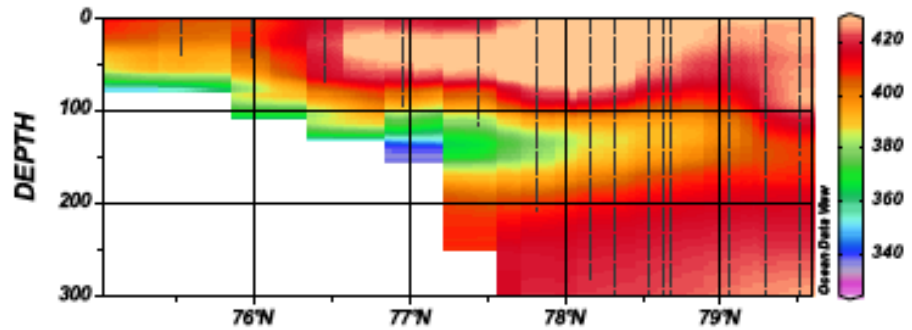
Target #3: *Indications of changes in upper-ocean circulation in the Eurasian and Makarov Basins*

- ✧ CTD survey
- ✧ Lagrangian drifters
- ✧ Analysis of atmospheric processes

2015 field campaign

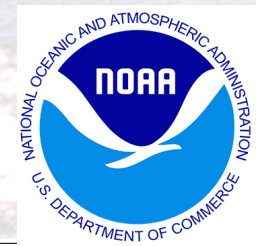




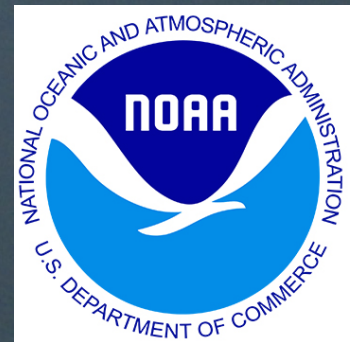
POTENTIAL TEMPERATURE**SALINITY****OXYGEN 2****CHLOROPHYLL****NO_2**

SUMMARY

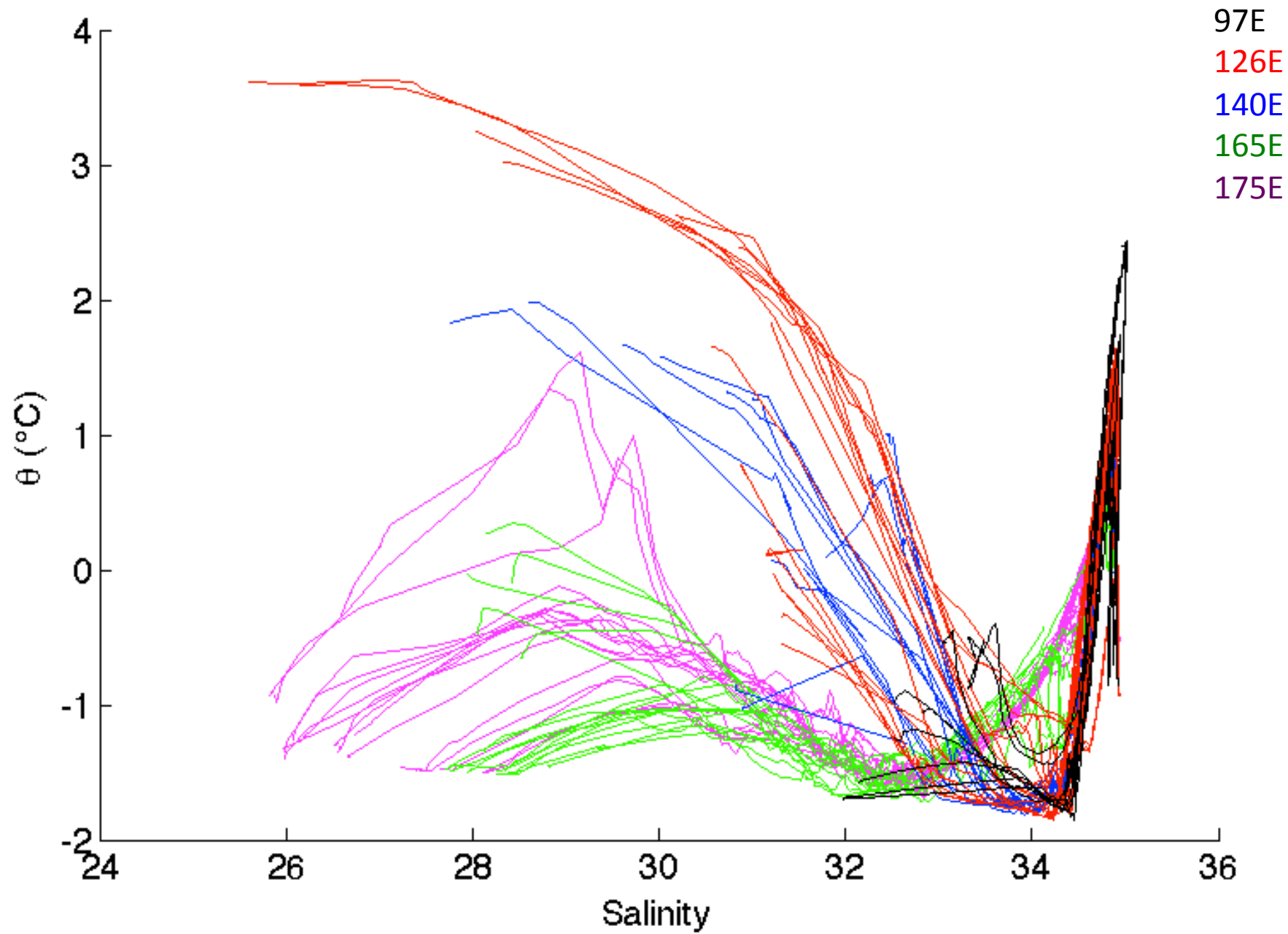
- *NABOS scientific results essential for understanding on-going changes in high-latitude regions*
- *Established observational network an important element of the Arctic Observing System*
- *International collaborations, unified experimental design may enhance existing observational capabilities*
- *Conduit for application of new technologies in Arctic Ocean research*
- *Design of the observational network sufficient to address research targets*

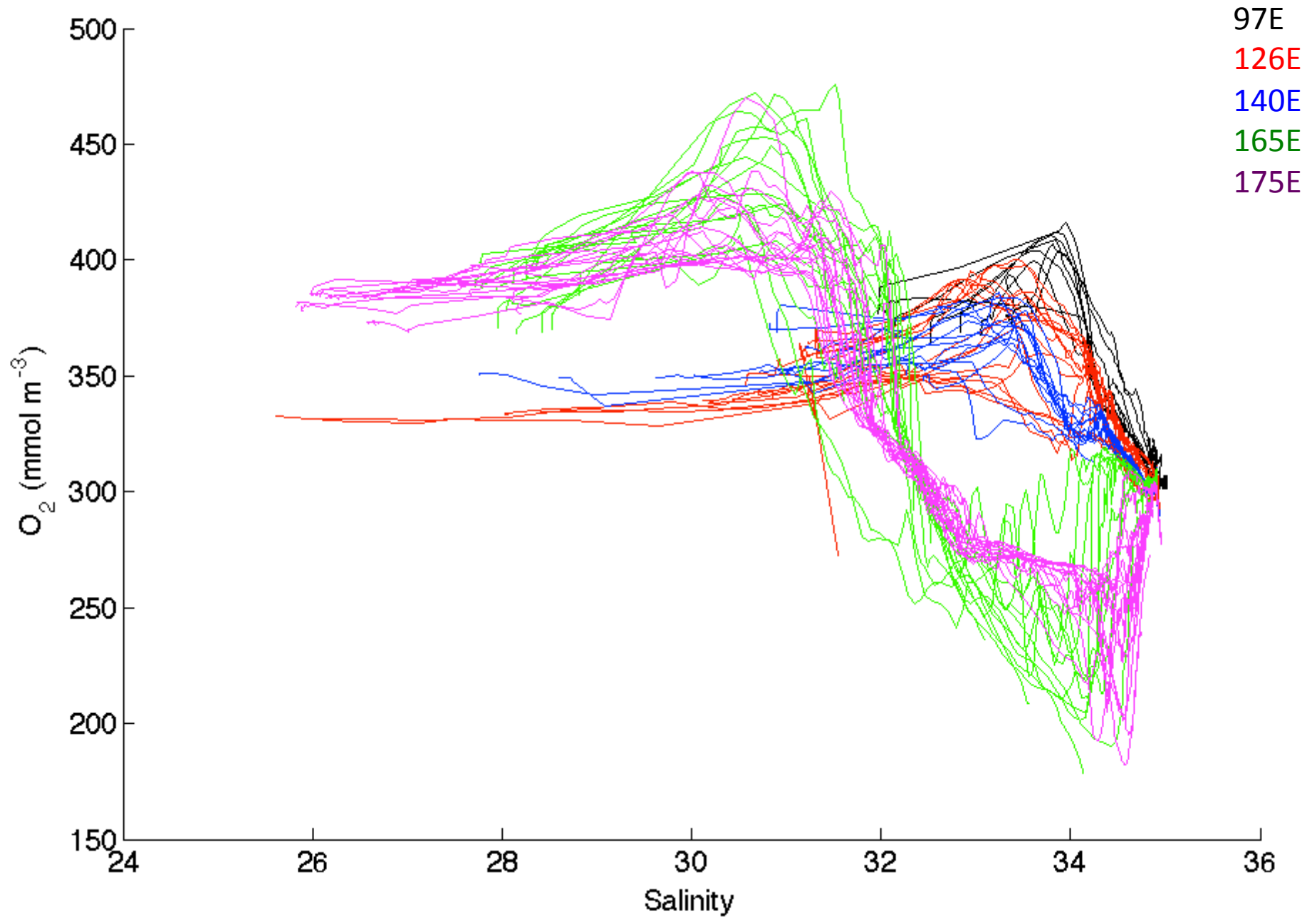


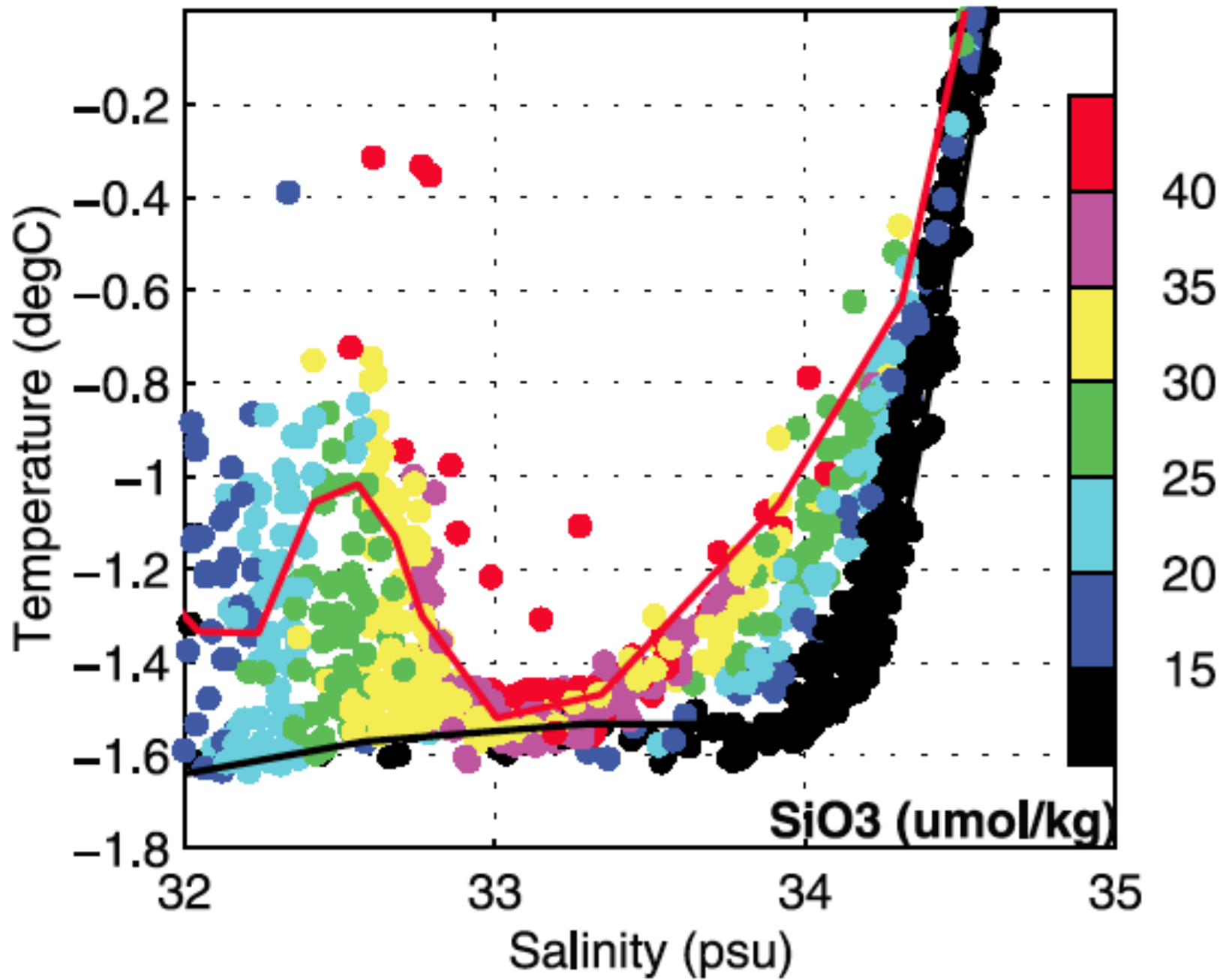
Thanks!

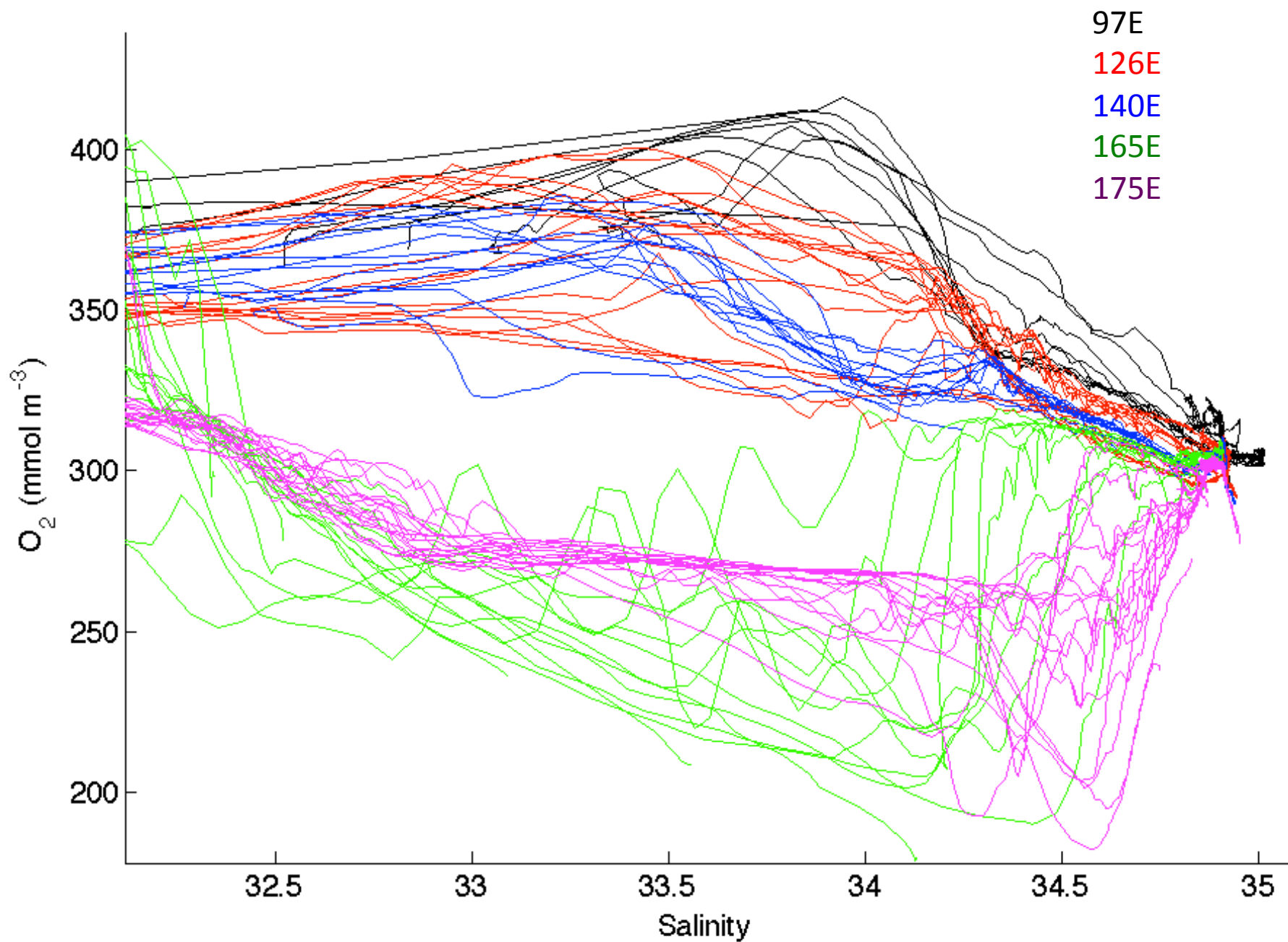


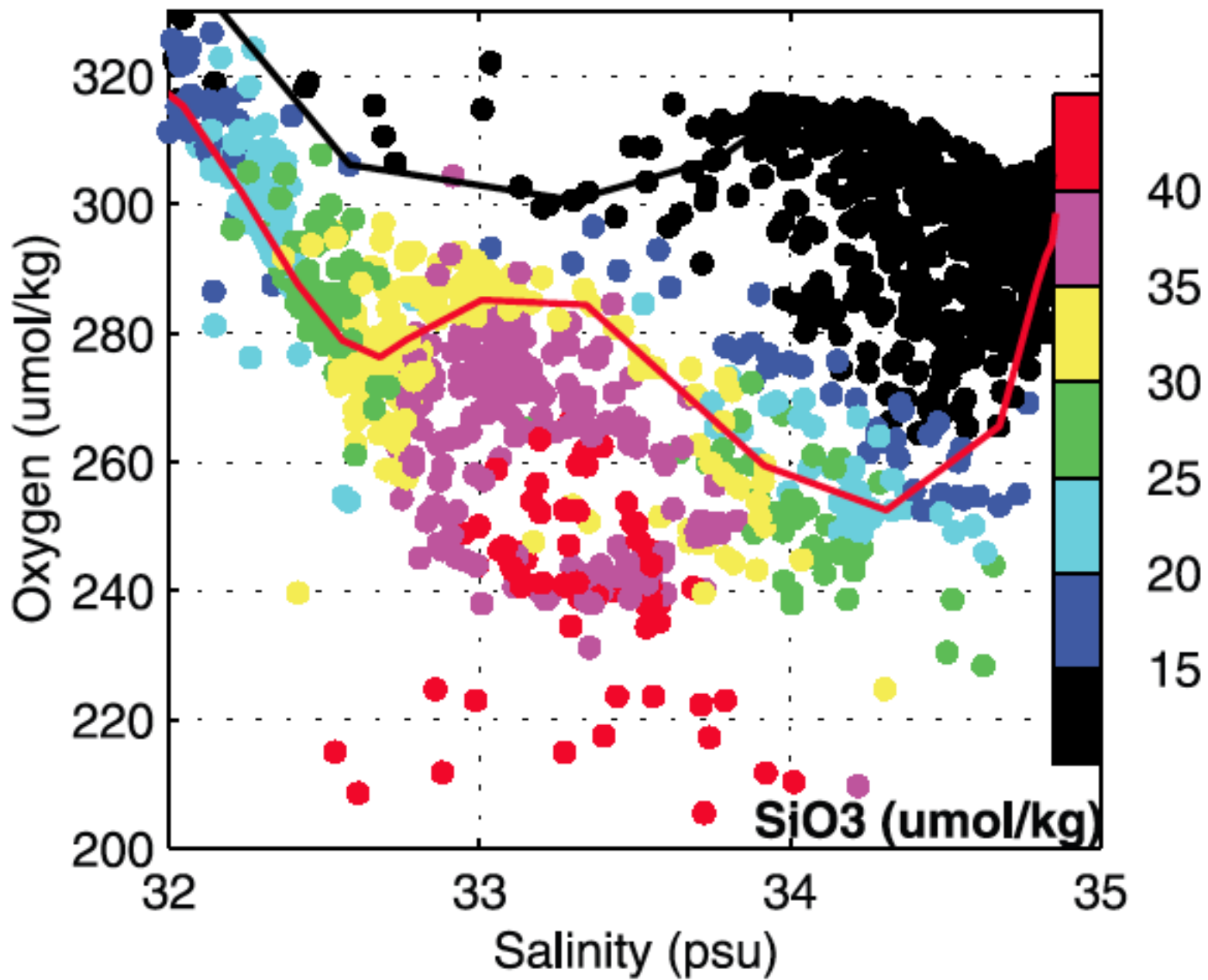
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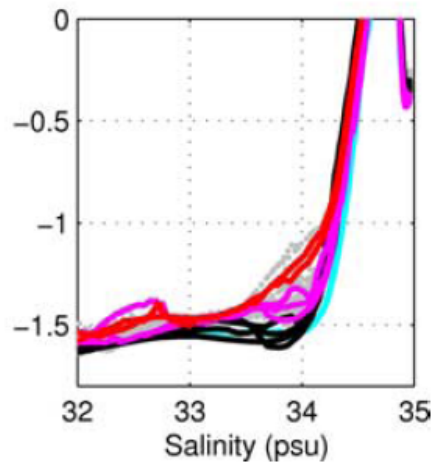
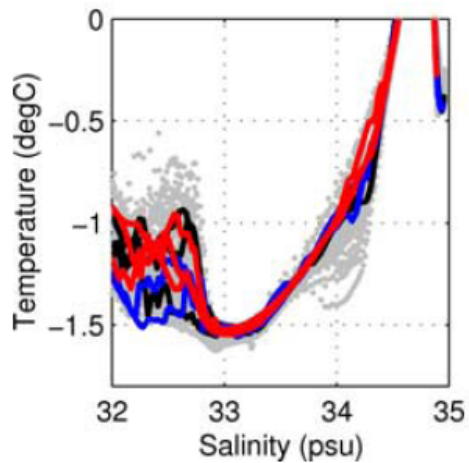
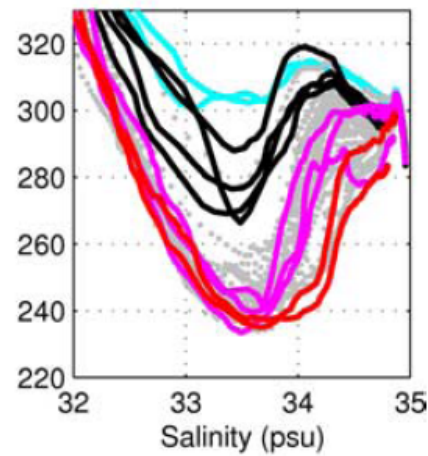
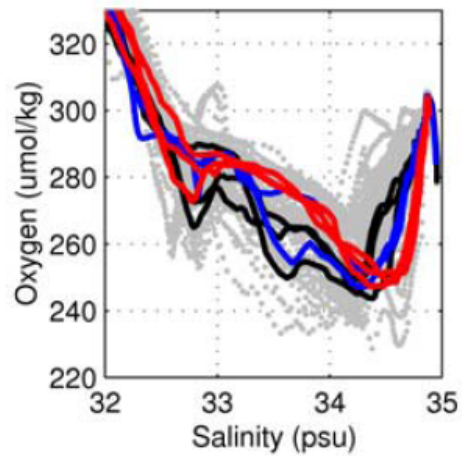
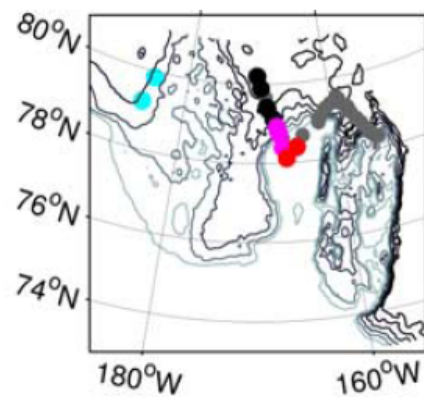
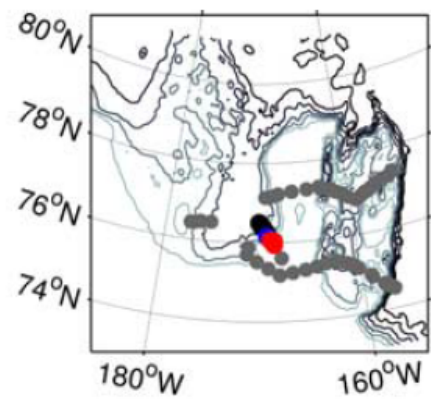












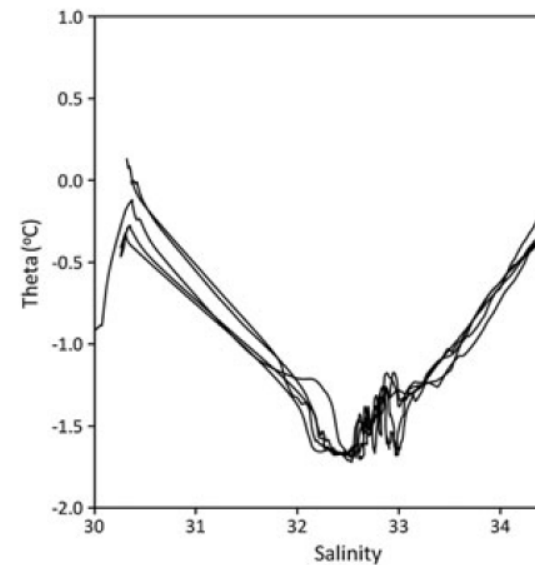
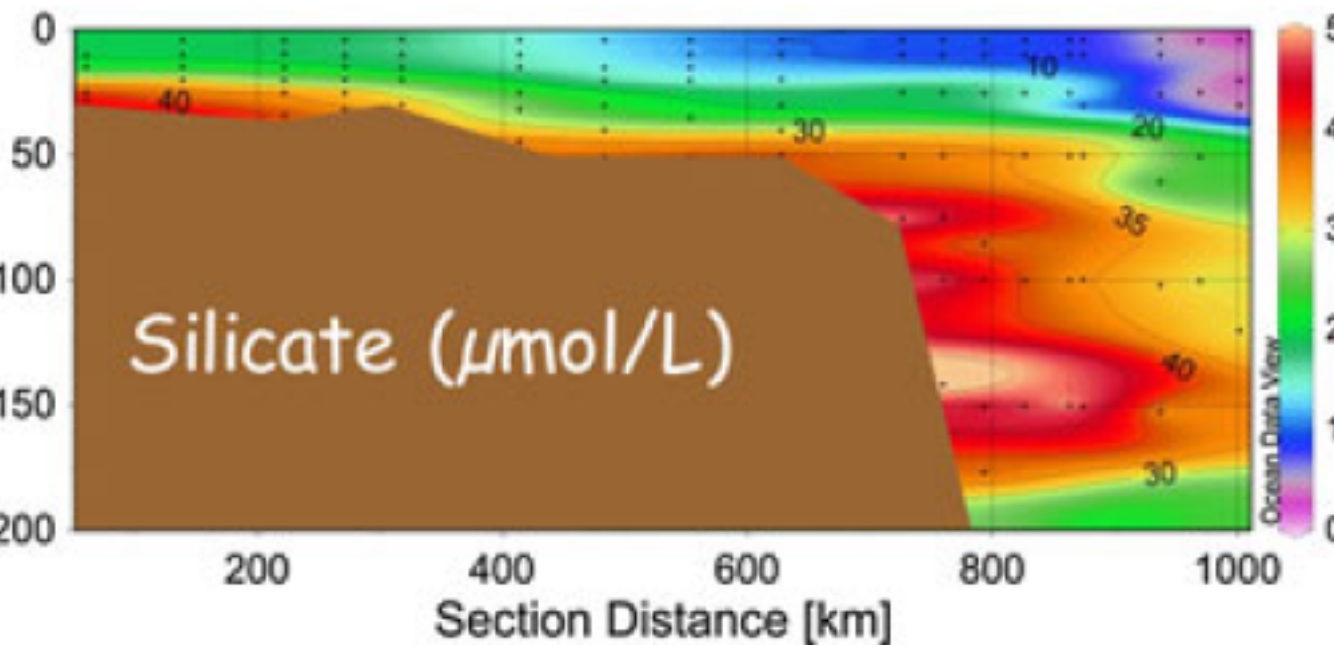
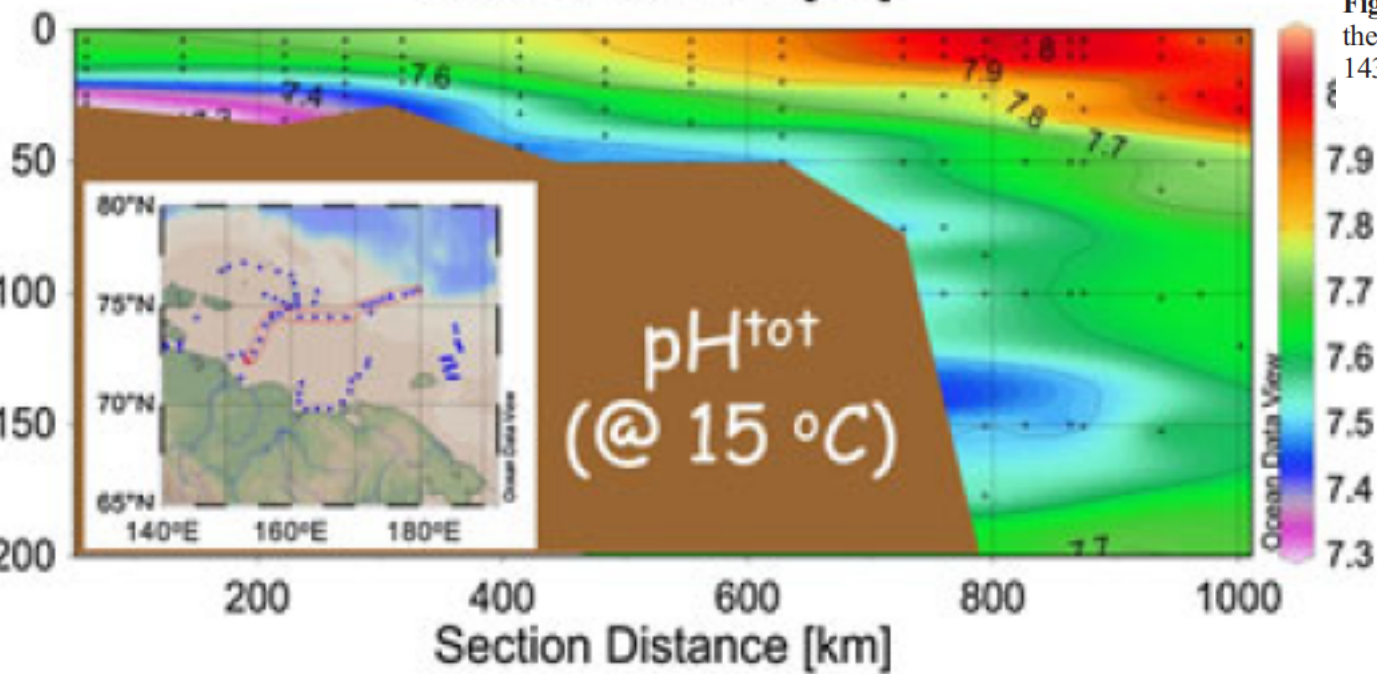
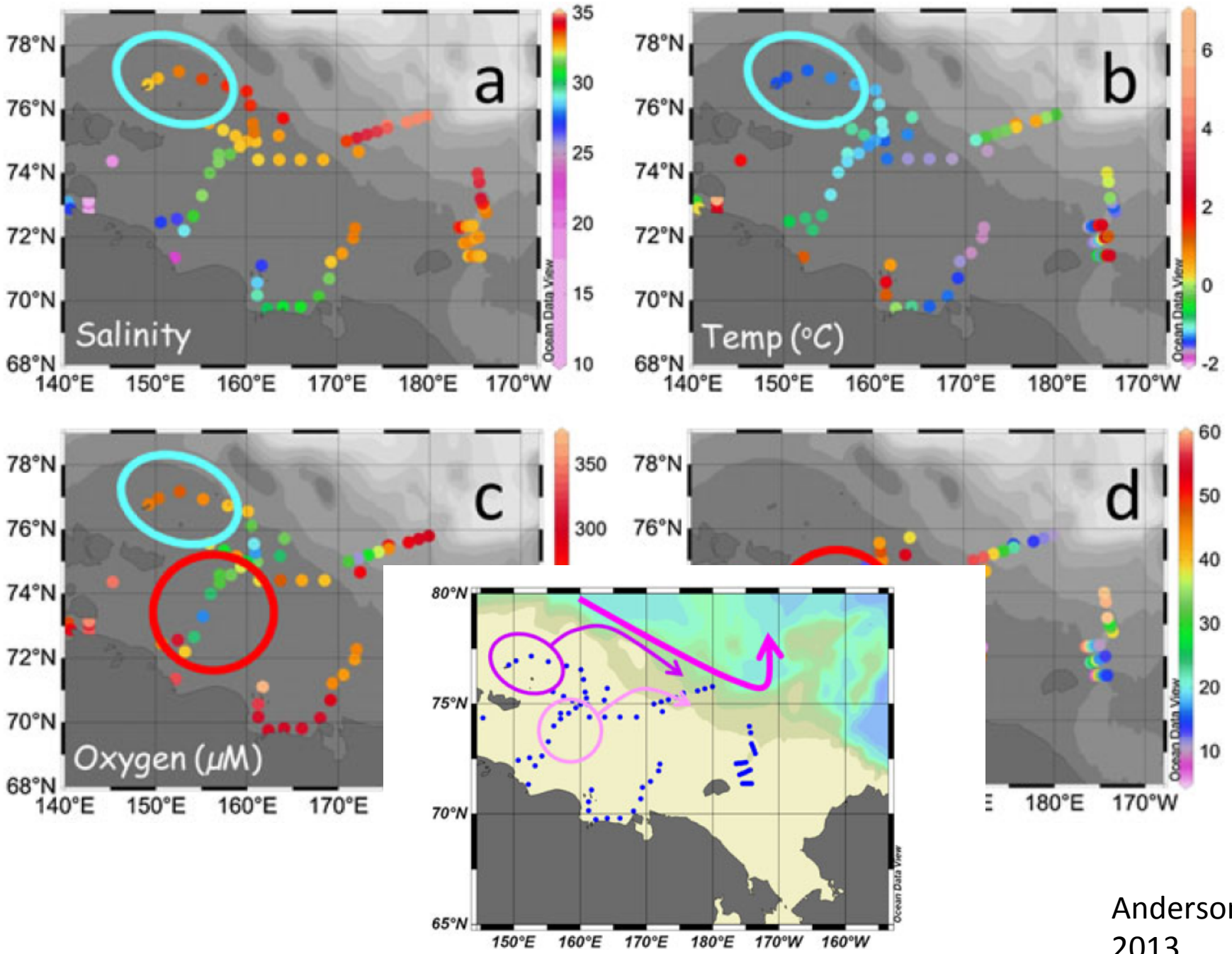


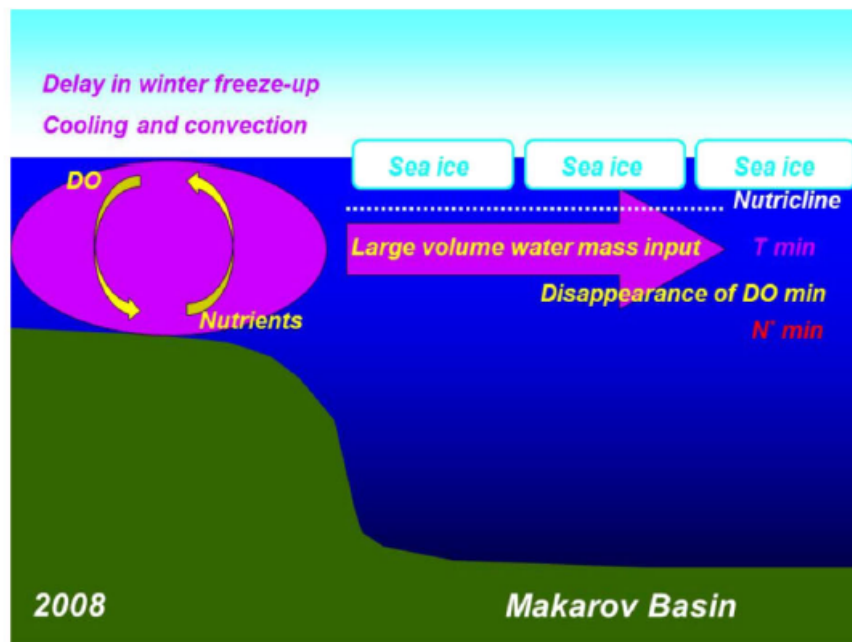
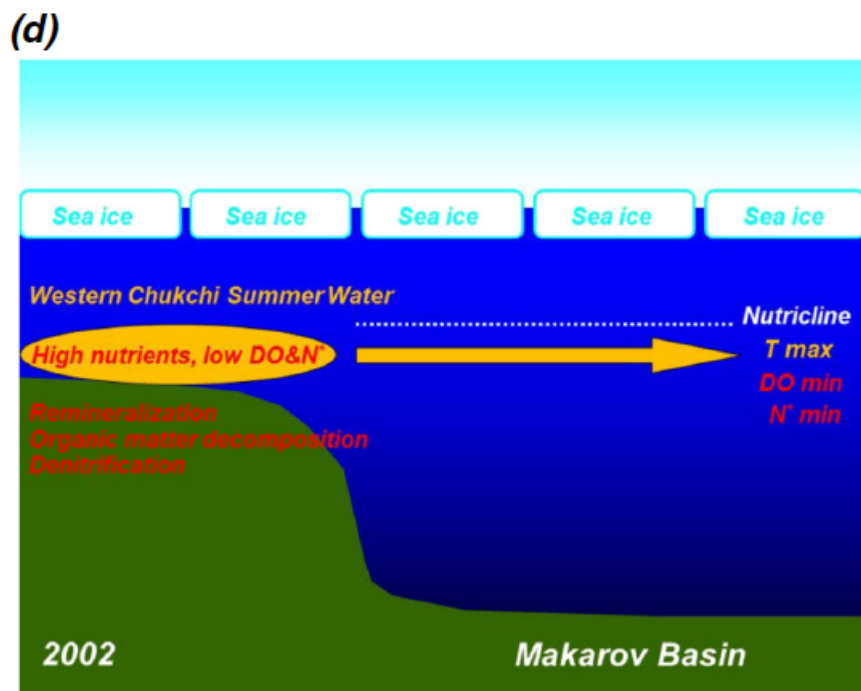
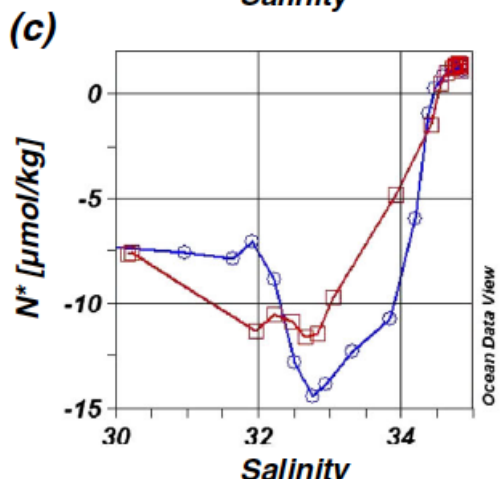
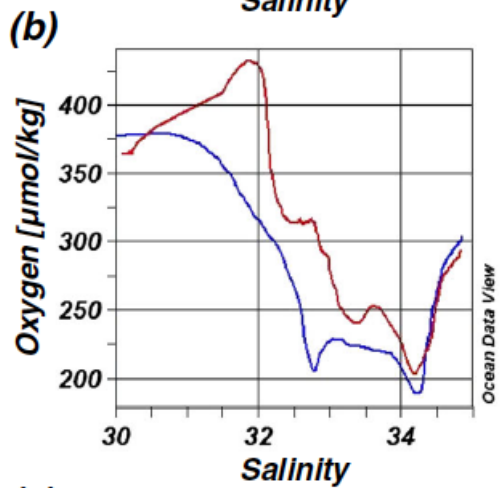
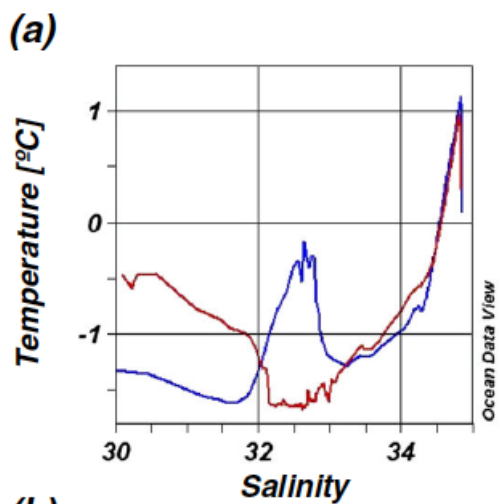
Figure 8. Temperature versus salinity for five depths along the East Siberian Sea shelf break, bottom depths of 143 and 334 m.





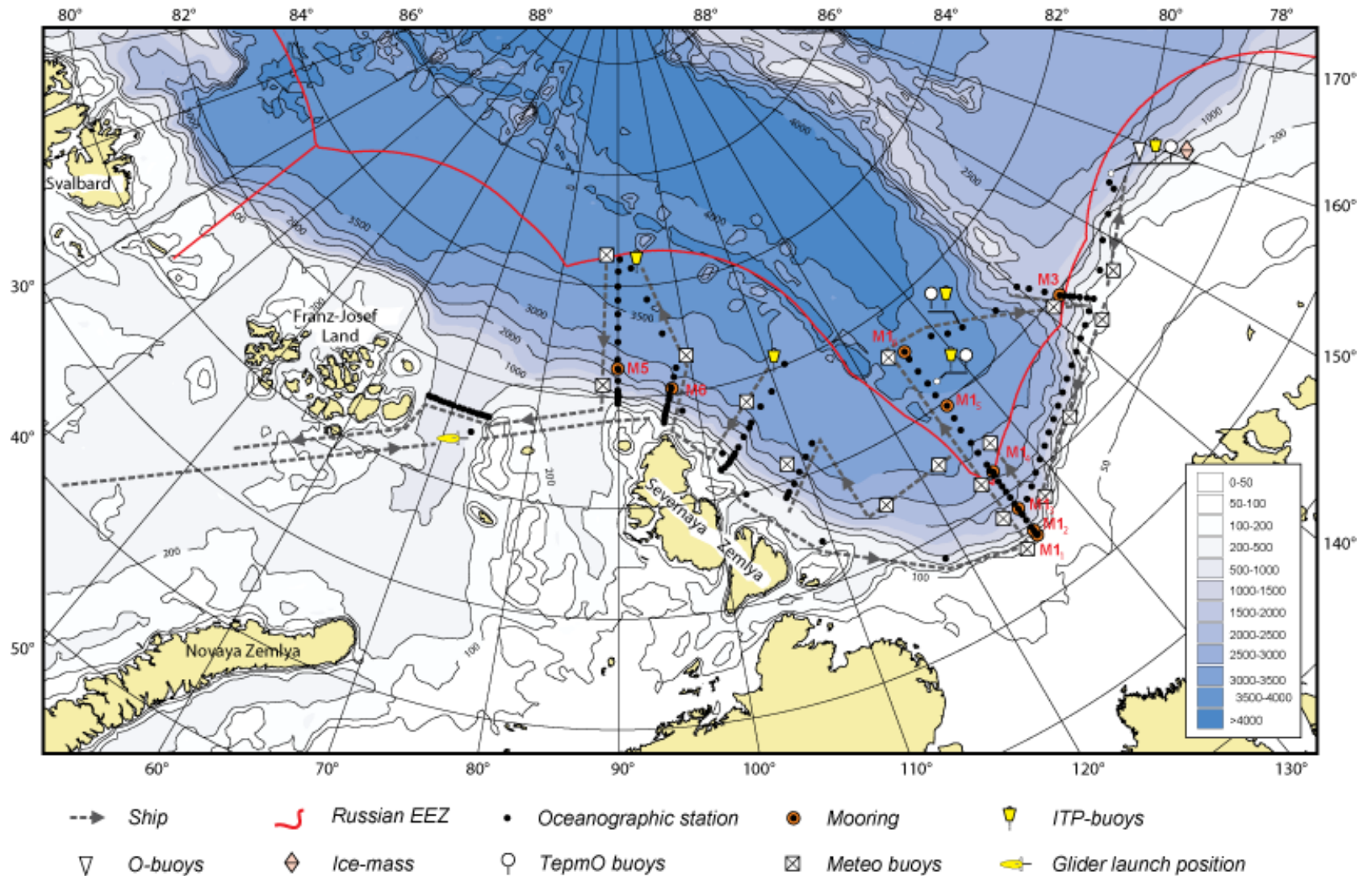
Anderson et al.
2013

Figure 12. Hypothetical formation of the halocline properties...



Nishino et al. (2013)

2013 field campaign



2013 Hydrochemical Summary

CTD survey of 116 stations

Oxygen for CTD calibration:	175 samples
Salinity for CTD calibration:	~350 samples
Barium:	880 samples
$\delta^{18}\text{O}$:	1254 samples
Nutrients:	1330 samples
Total Chlorophyl:	583 (142 for size fractions)
Phytoplankton photo-physiology:	500 assessments
Dissolved Inorganic Carbon:	255 samples
Submersible Ultraviolet Nitrate Analyzer:	72 profiles
Dissolved Si:	2414 samples
Methane:	132 stations
Organic Carbon/n-alkanes:	193 samples
Dissolved Organic Matter (C/N/P):	438/438/2401

2015 Hydrochemical Summary

CTD survey of 94 stations

Oxygen for CTD calibration:	121 samples
Salinity for CTD calibration:	116 samples
Barium:	639 samples
$\delta^{18}\text{O}$:	1400 samples
Nutrients:	1277 samples
Total Chlorophyll:	564 samples
DNA:	304 samples
Dissolved Inorganic Carbon:	237 samples
Submersible Ultraviolet Nitrate Analyzer:	78 profiles
Enzymes:	10 samples
DOC:	443 samples
POC:	256 samples
Primary production:	10 stations

