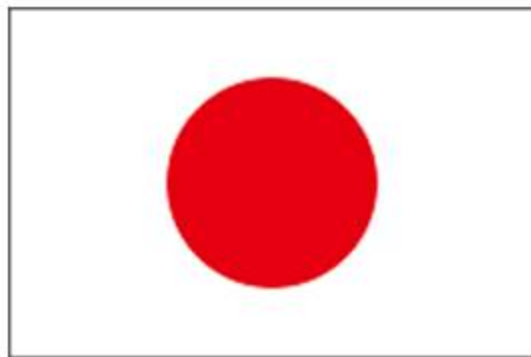


Brief update of recent activities and results for DBO:

Japan DBO results

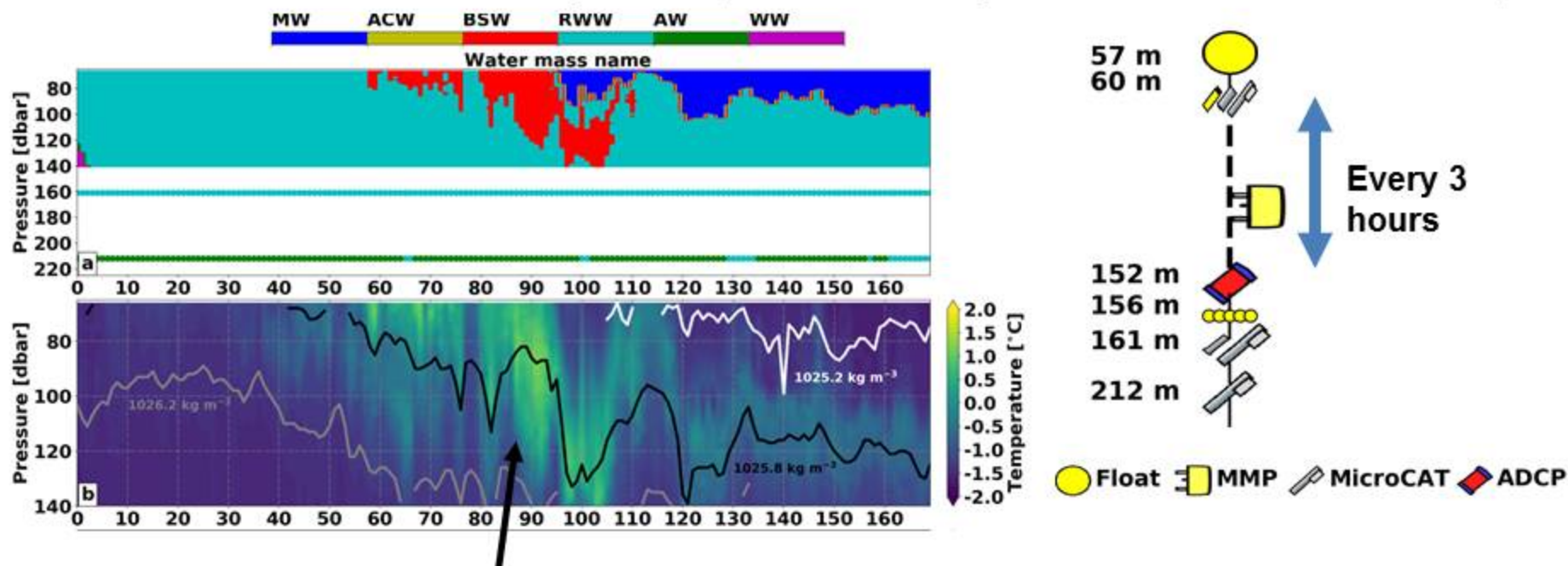


Shigeto Nishino

The warming of the Chukchi slope through the Barrow Canyon outflow in the 2016–2017 winter

Kimura, S., Onodera, J., Itoh, M., Kikuchi, T., Nishino, S., Kawaguchi, Y., et al. (2019). *Journal of Geophysical Research: Oceans*, 124, 1–20. <https://doi.org/10.1029/2019JC015093>

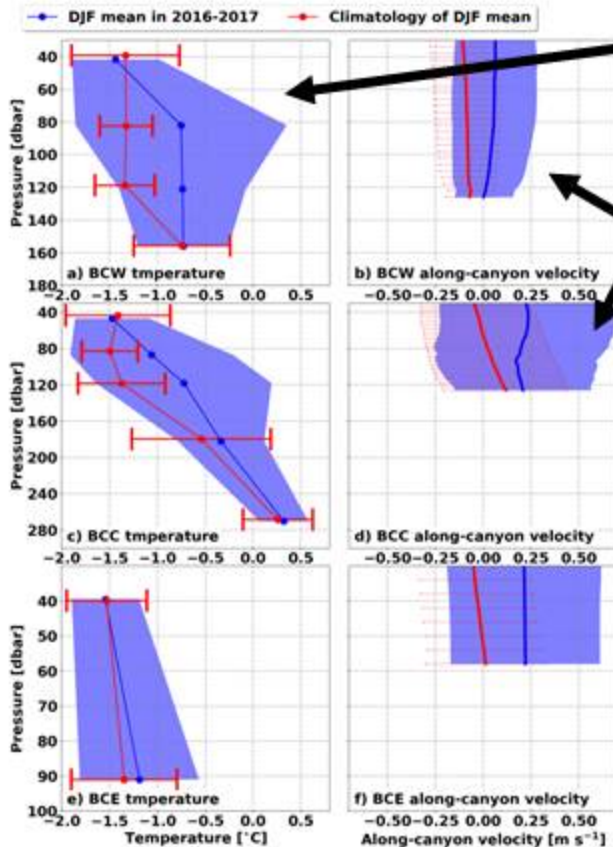
Time series of water mass and temperature profiles from Sep 2016-Mar 2017 on Chukchi slope



Where did the warm water come from?

Is the presence of warm water in winter a persistent feature?

The water types are correlated well to the western and central sector of Barrow Canyon.



1. BCW temperature in 80-120 dbar is anomalously high in DJF 2016-2017 compared to the climatology.
2. The flow in Barrow Canyon is toward the Chukchi slope in DJF 2016-2017.
3. The sustained northward winds and the ocean temperature south of the Chukchi Sea favour the warm Barrow Canyon outflow for the first time in our record.

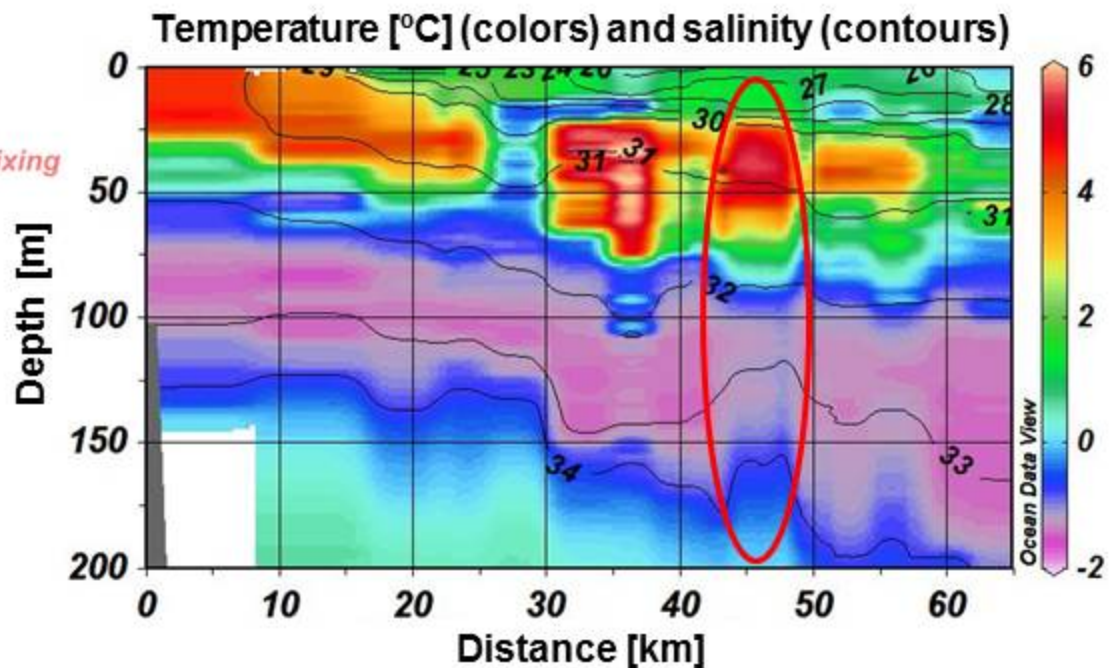
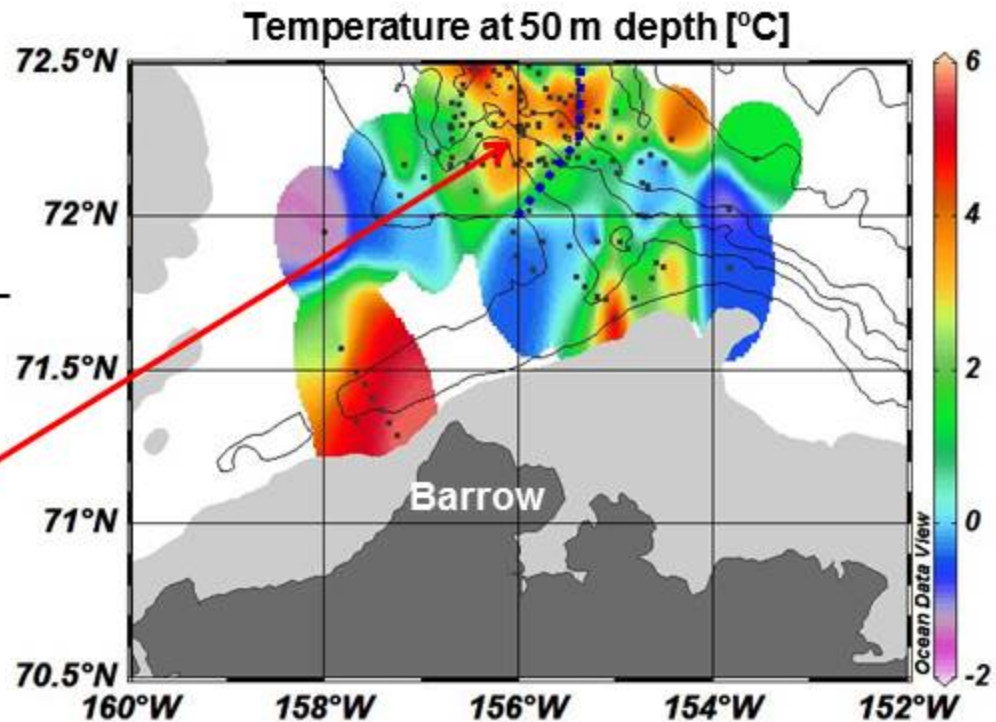
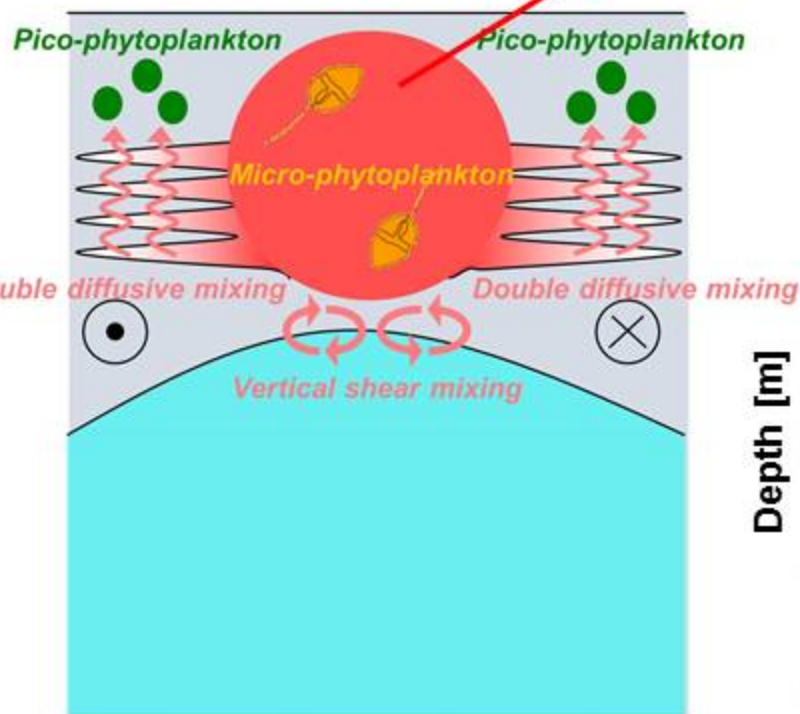
DJF = December, January, and February
 BCW = Barrow Canyon West
 BCC = Barrow Canyon Center
 BCE = Barrow Canyon East.

Temperature and velocity profiles from 3 Barrow Canyon moorings

Cyclonic warm-core eddy and its impact on the Arctic marine ecosystem

Nishino *et al.* [2018; GRL]

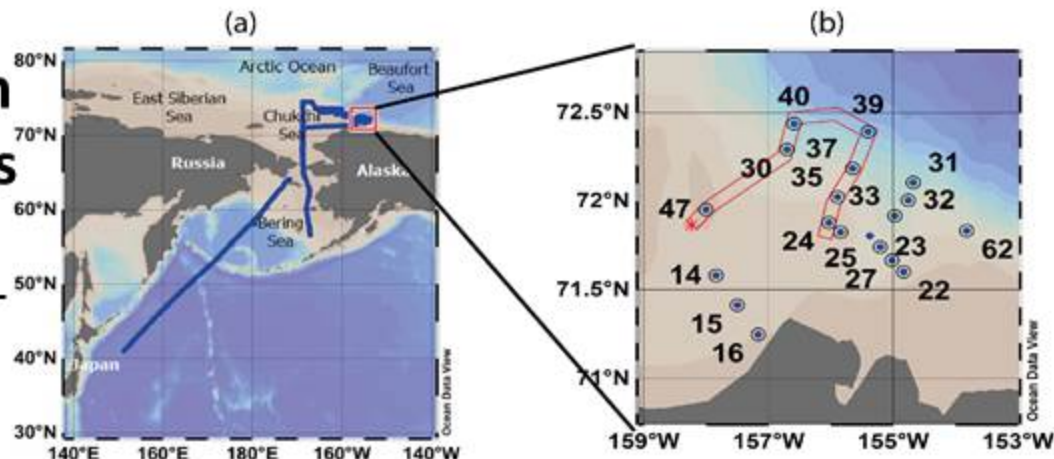
Cyclonic warm-core eddy



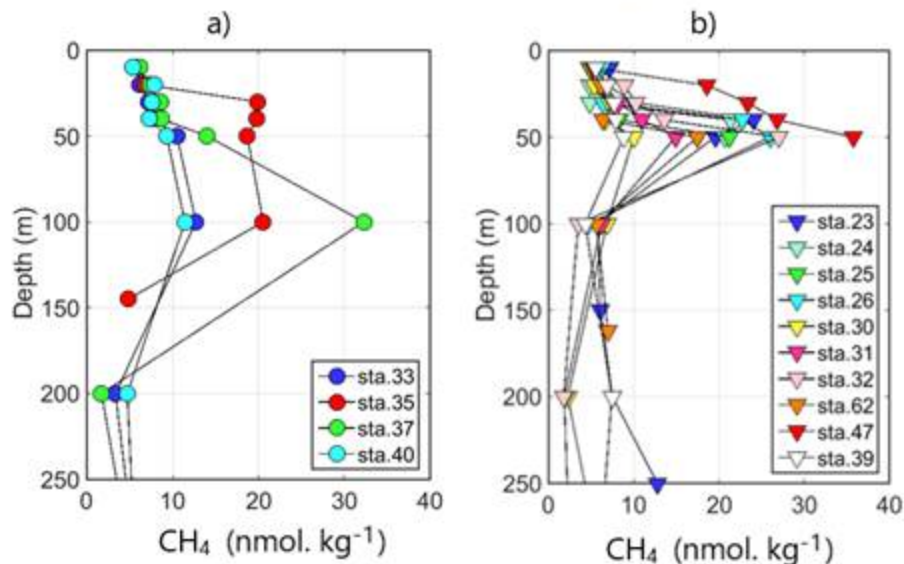
Influence of warm-core eddy on dissolved methane distributions in the southwestern Canada

Bui *et al.* [(accepted), Polar Science]

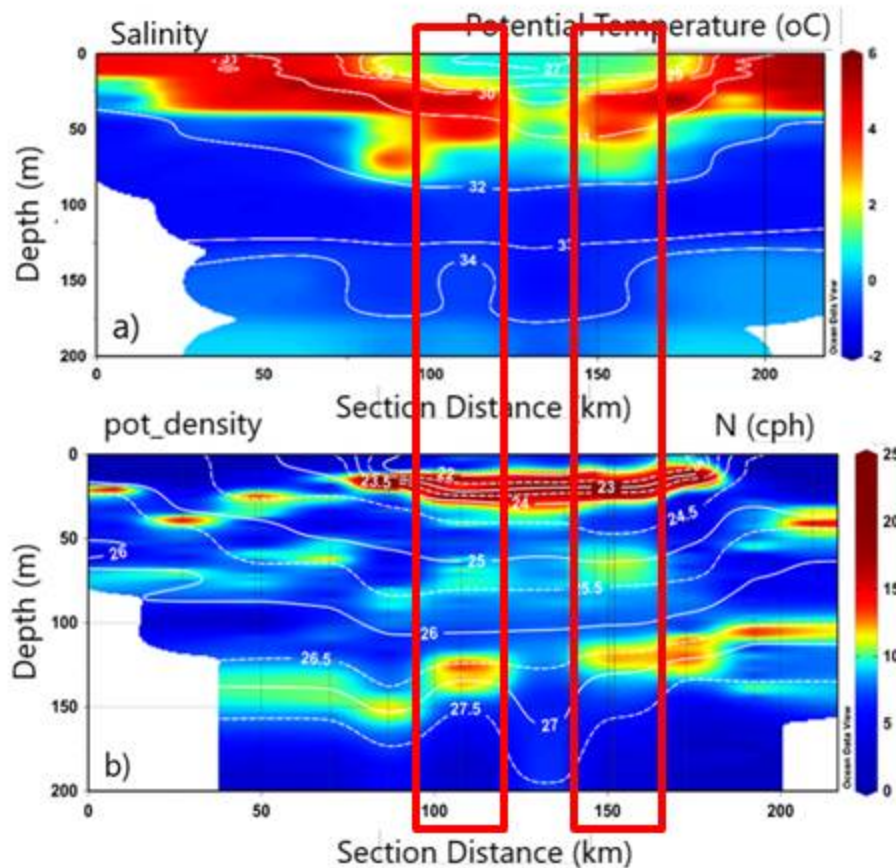
Extension of sub-surface CH₄ peaks within the warm-core vs outside eddy was found.



cruise track of the R/V *Mirai* (MR15-03 Leg1)

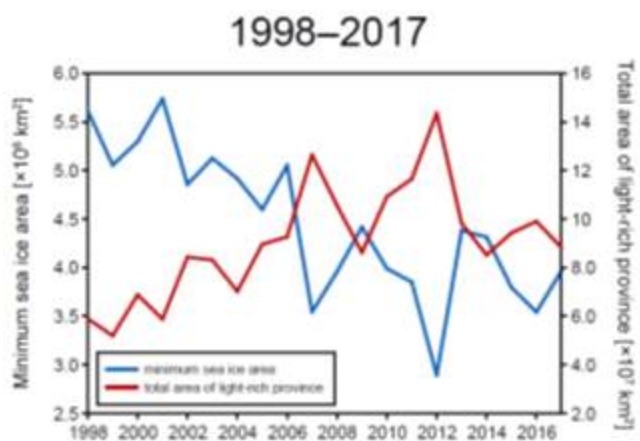
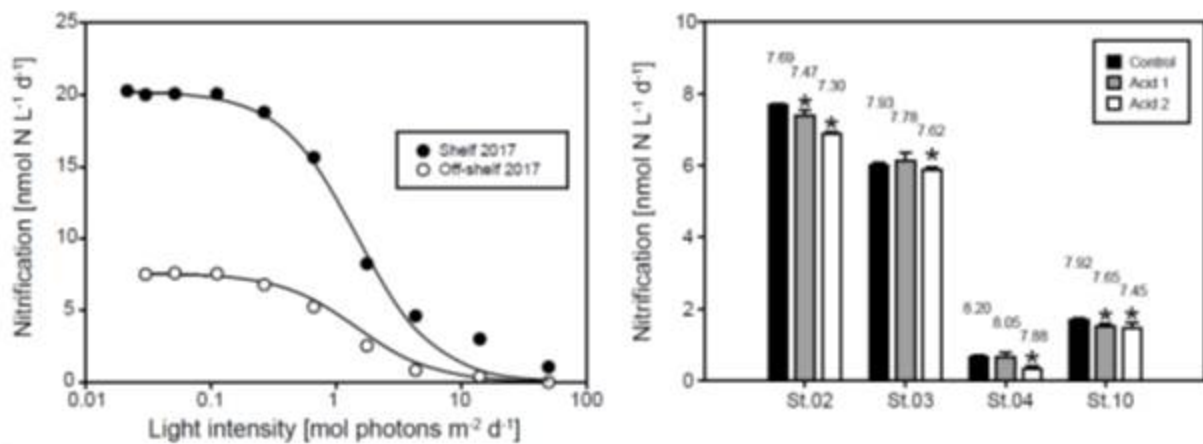


Vertical profiles of dissolved CH₄ concentrations in the southwestern Canada Basin (a) inside and (b) outside of the warm-core eddy.

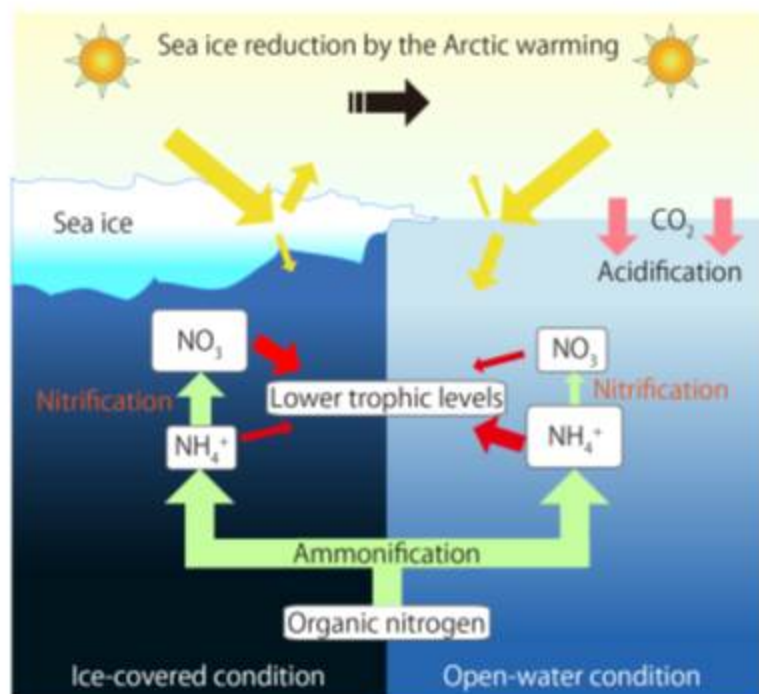


Arctic nitrification is primarily regulated by the light environment and may have experienced a decreasing trend over the last two decades

Shiozaki *et al.* [2019, *Global Biogeochem. Cycles*] (Press released)

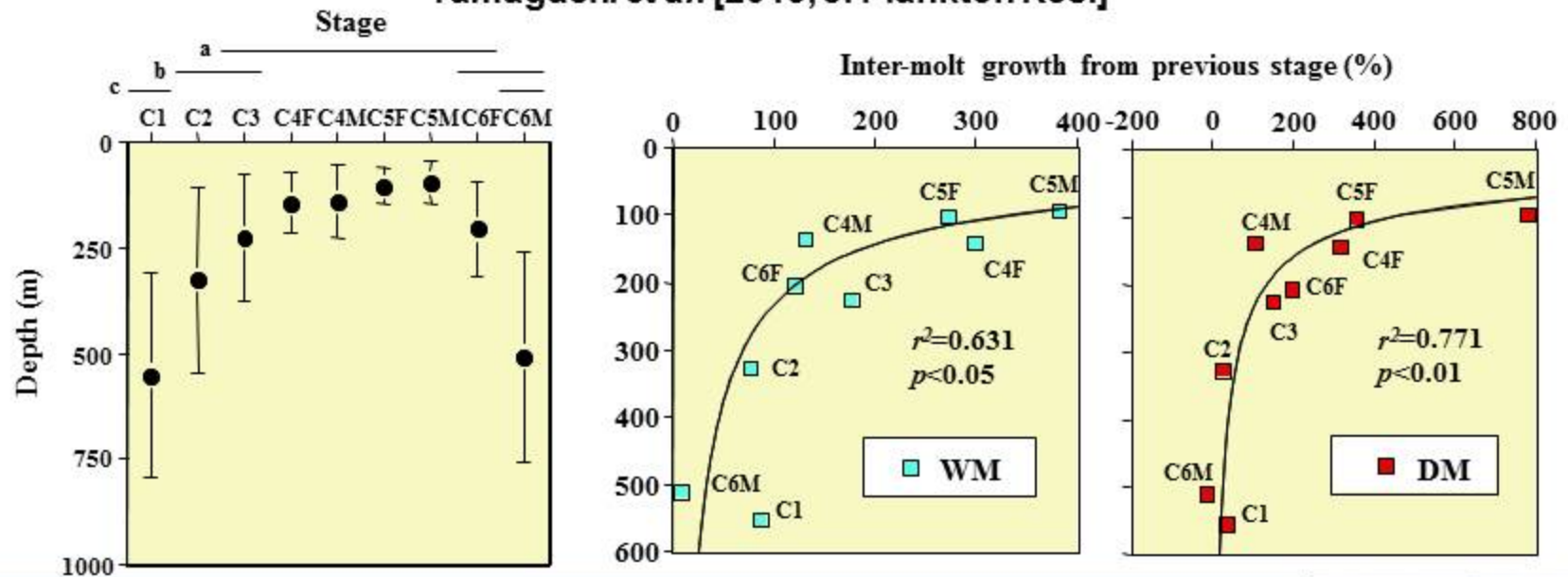


A decrease in nitrification could alter the composition of inorganic nitrogen and consequently impact ecosystem structure



Ontogenetic vertical migration of mesopelagic copepods

Yamaguchi et al. [2019, J. Plankton Res.]



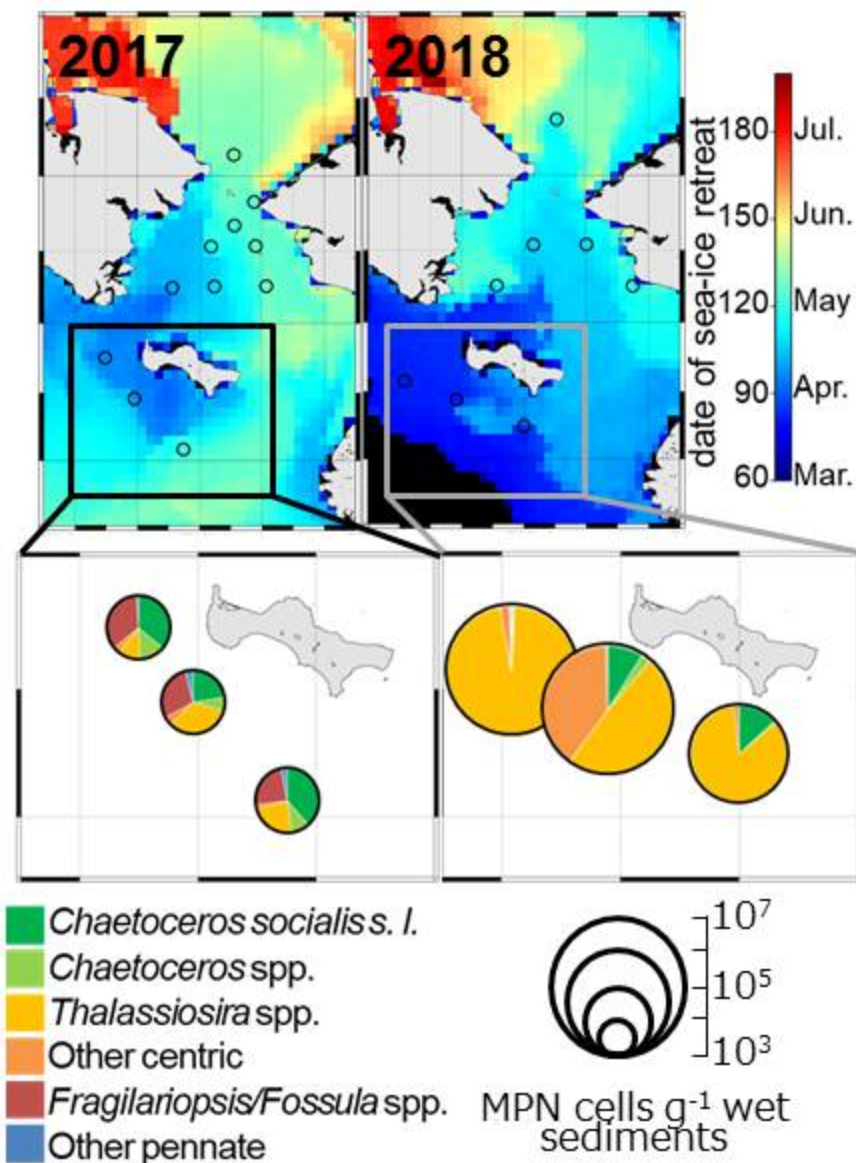
- ✓ Based on time-series samples collected at **ice-station through one year (SHEBA, 1996-1997)**, ontogenetic vertical migration (OVM) of dominant carnivorous mesopelagic copepod (*Paraeuchaeta glacialis*) was evaluated.
- ✓ They have **specialized OVM** which characterized with spending deep-layer at early stage and adults. **This OVM is related to their inter-molt growth**: thus, great growth is achieved for stages distributing at shallower depths.
- ✓ **Comparison with MOSAiC will be interesting** as a future project.



Mesopelagic carnivorous copepod *Paraeuchaeta glacialis*

The community composition of diatom resting stages: the relationship to interannual changes in the sea ice extent

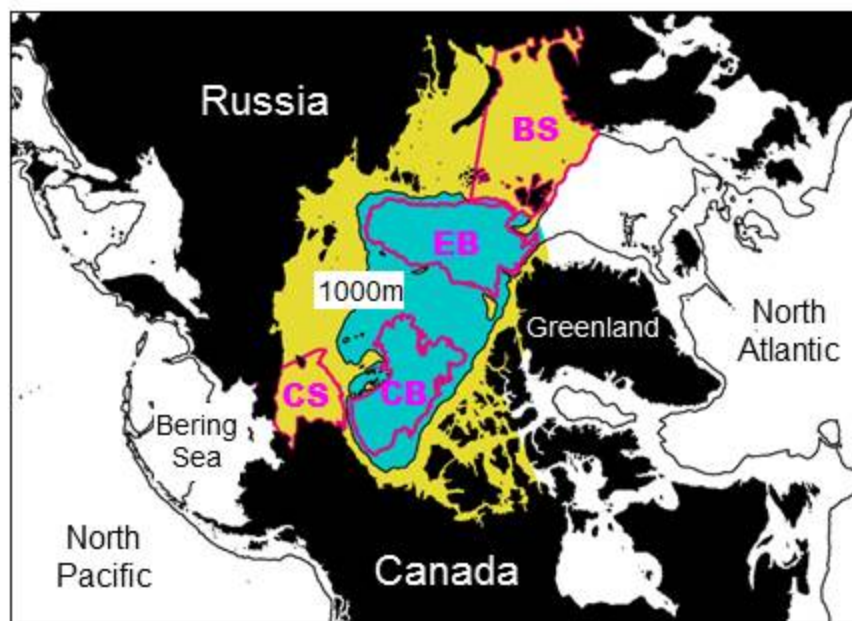
Fukai *et al.* [2019, Polar Biol.]



- ✓ We compared **the viable diatom resting stages** in sediments during the summer of 2017, when the sea ice retreat was late, and 2018, when the sea ice retreat was early.
- ✓ South of St. Lawrence Island, the cell density was 10–100 times greater in 2018 than it was in 2017.
- ✓ The taxonomic composition also showed large annual differences: *Fragilariopsis/Fossula* spp., which are **ice algae species**, were abundant in 2017, but *Thalassiosira* spp. dominated in 2018.
- ✓ It was suggested that **sea ice diminished before the ice-edge bloom in 2018, but sea ice remained until the ice-edge bloom in 2017.**

Ice Algal Productivity

Watanabe et al. (2019) Multi-model intercomparison of the pan-Arctic ice-algal productivity on seasonal, interannual, and decadal timescales, *JGR, in press*

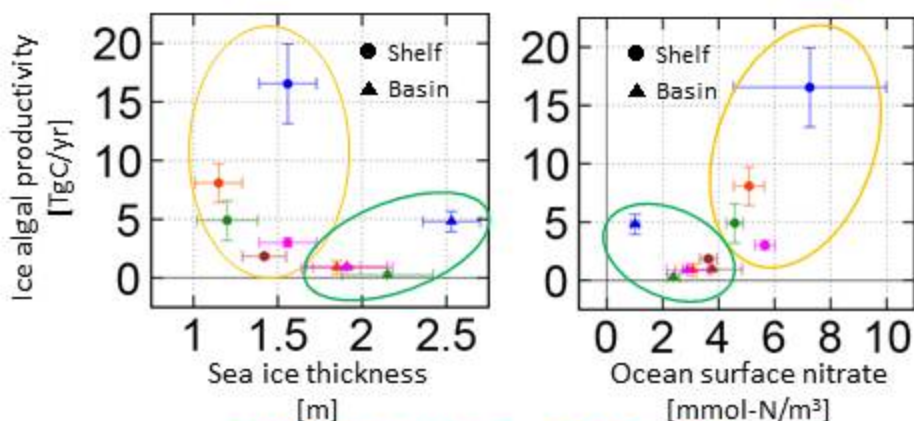


Uncertainties and controlling factors in several sub-regions are analyzed

Dataset is available at Arctic Data Archive System (ADS)

“Primary productivity of sea-ice algae and the related variables in the Arctic Ocean simulated by five FAMOS models”

[<https://ads.nipr.ac.jp/dataset/A20190924-001>]



JAMSTEC UAF-G UAF-R UVic UW

- Sharp shelf–basin contrast
- No significant decadal trend
- Stable habitat and enough light are both necessary for high PP
- Spring nitrate is a controlling factor
- Maximum growth rate parameter accounts for inter-model spread