Pacific Arctic Group 2017 Fall Meeting
November 6-7, 2017
PMEL/NOAA
Seattle, WA, USA

Country Report: Results from 2017 season and future planning

JAPAN

Shigeto Nishino (JAMSTEC)

Japanese Arctic cruises completed in 2017

- T/S Oshoro-maru cruise (6 Jul to 2 Aug)
- R/V Mirai cruise (23 Aug to 1 Oct)

Japanese Arctic cruise planed in 2018

- T/S Oshoro-maru cruise (29 Jun to 15 Jul)


T/S Oshoro-maru (Hokkaido Univ.)

R/V Mirai (JAMSTEC)

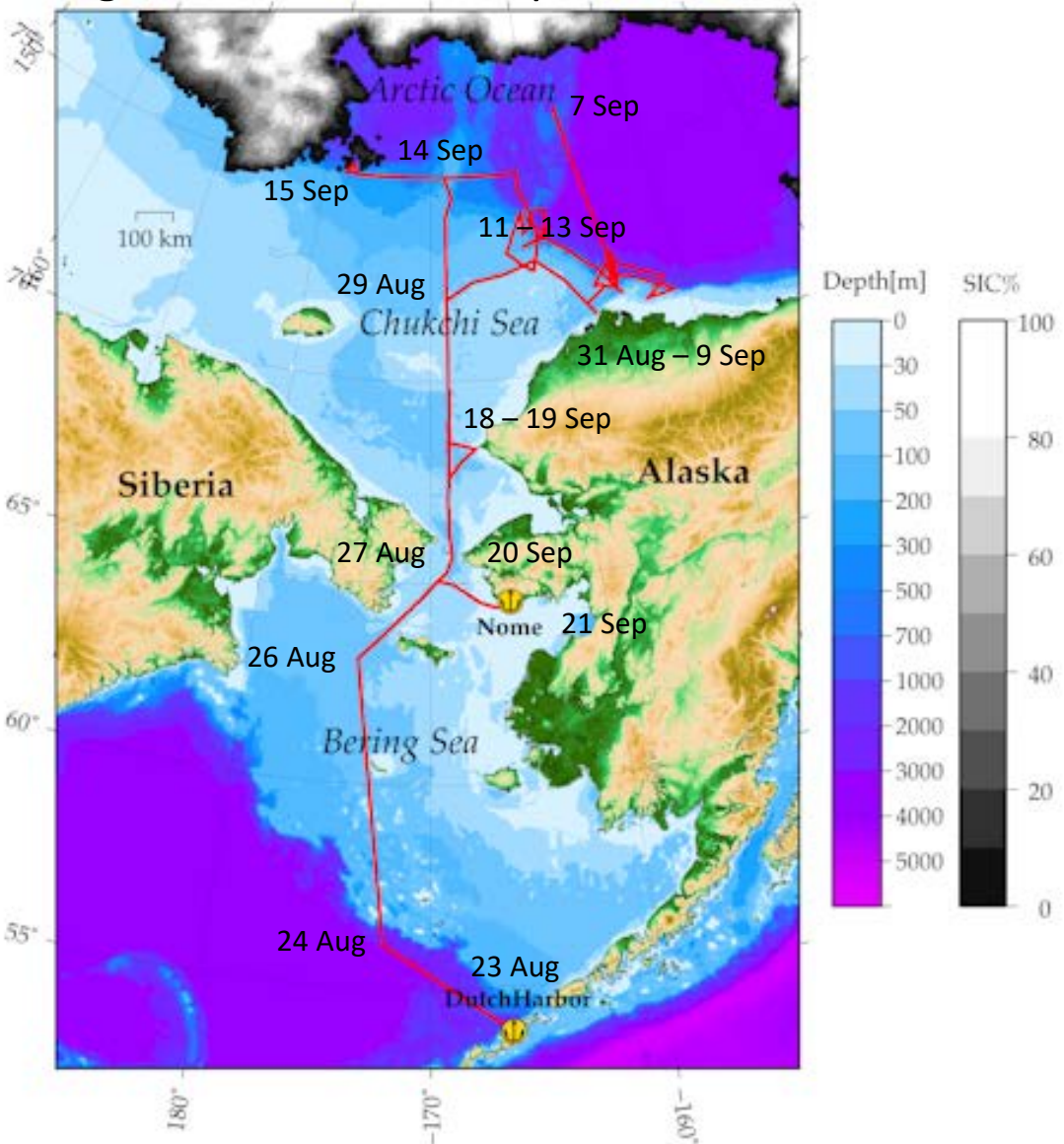
Summary of R/V Mirai Arctic Ocean Cruise in 2017 (MR17-05C)

This cruise is conducted under the "Arctic Challenge for Sustainability Project (ArCS)" that is funded by Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.
See more details: http://www.arcs-pro.jp/en/index.html

From R/V Mirai blog

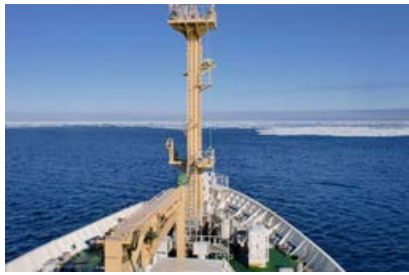
Schedule of MR17-05C

Cruise track and sea ice concentration (SIC) averaged over 12 to 15 September 2017



Research themes of MR17-05C

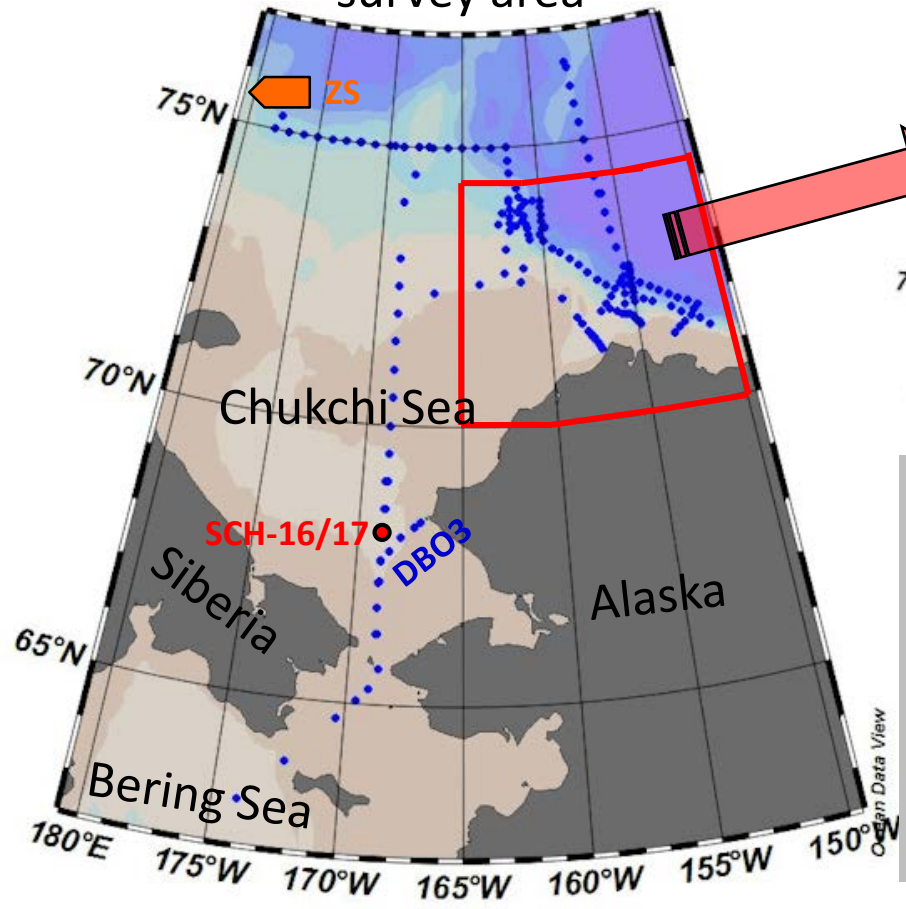
from JAMSTEC, NIPR, NIES, Hokkaido Univ., IARC, SIO, etc.



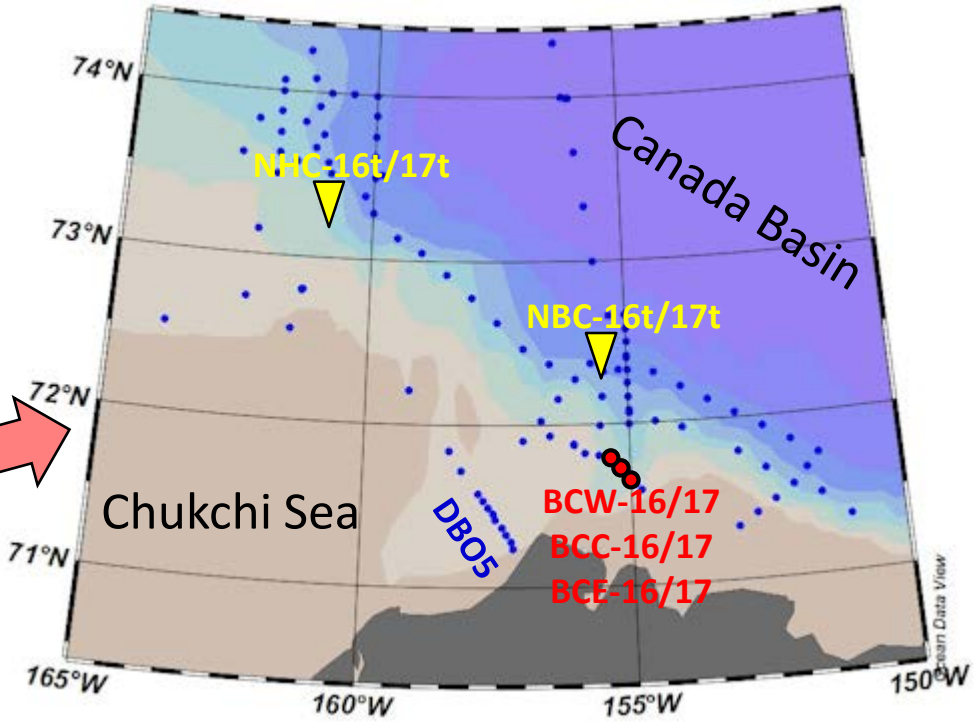
- Predictability study on weather and sea-ice forecasts linked with user engagement
- Ship-borne observations of trace gases/aerosols over the Arctic
- Ship-board observations of atmospheric greenhouse gases and related species in the Arctic Ocean and the western North Pacific
- Observational study on environmental changes in the Pacific Arctic Ocean with intensive surveys in the shelf slope area
- Spatial and temporal changes of seawater CO_2 and CH_4 in the western Arctic Ocean
- How plankton responses to multi stressors such as ocean warming and acidification?
- Response of phytoplankton community under environmental change
- Comparison of zooplankton with differences in net mesh-size, spatial distribution of zooplankton and standing stock and material flux role of Appendicularians
- Seasonal distribution of krill-eating top predators and their prey in the Chukchi Sea during fall
- and more . . .

Observation stations of MR17-05C

Map of the whole survey area



Enlarged map of the slope area

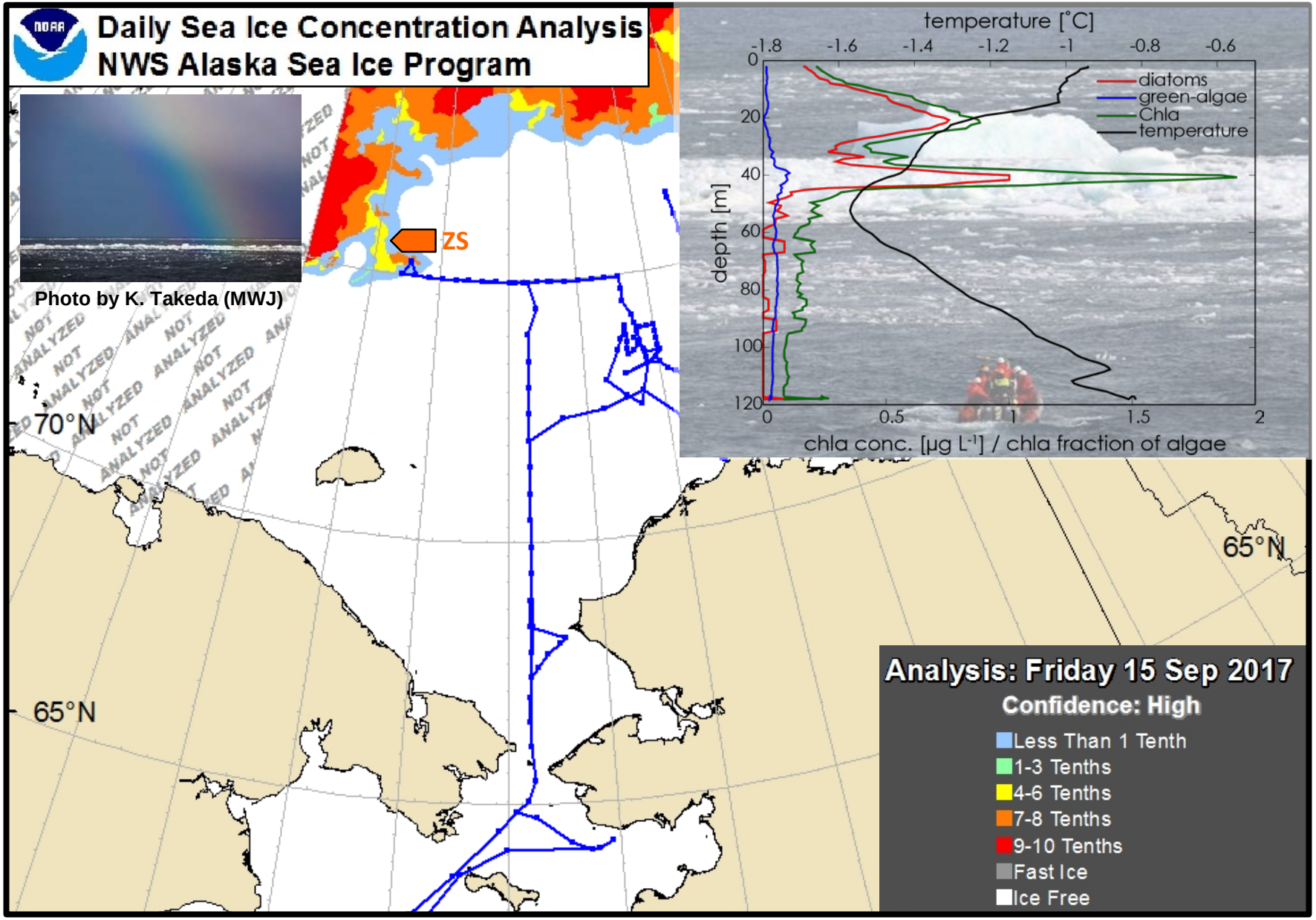


Activities

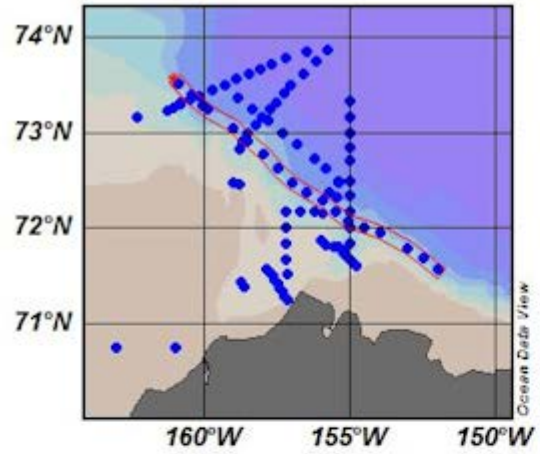
- : CTD/XCTD, TurboMAP, Plankton net, Bio-optics observation
- : Mooring
- : Sediment trap
- : Zodiac survey

DBO: Distributed Biological Observatory

Sea ice concentration and cruise tracks of MR17-05C

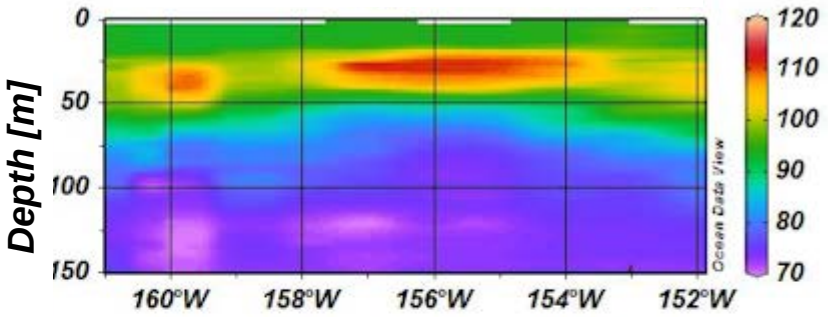


＜2016 field results＞ Vertical sections along a 500 m depth isobath

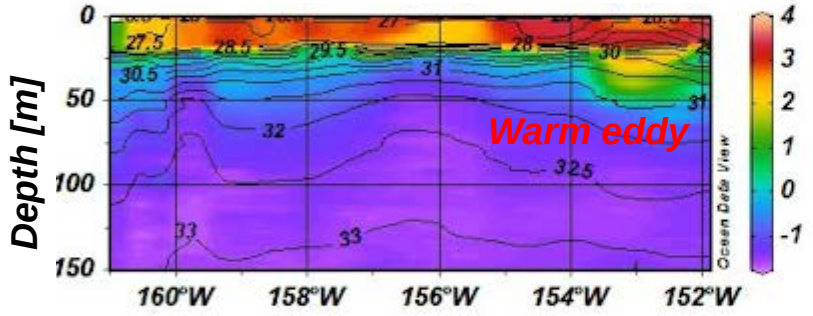


Along 500m isobath

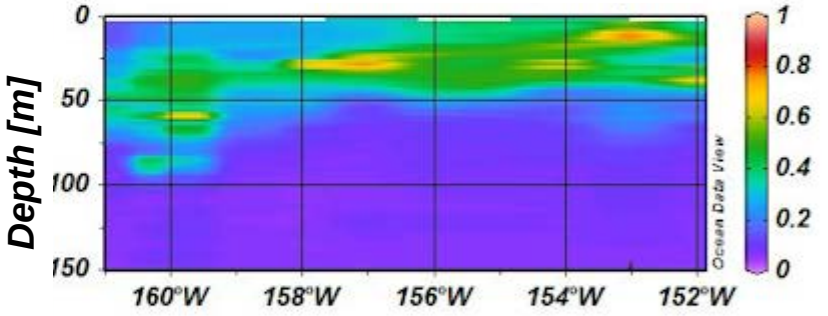
Oxygen saturation [%]



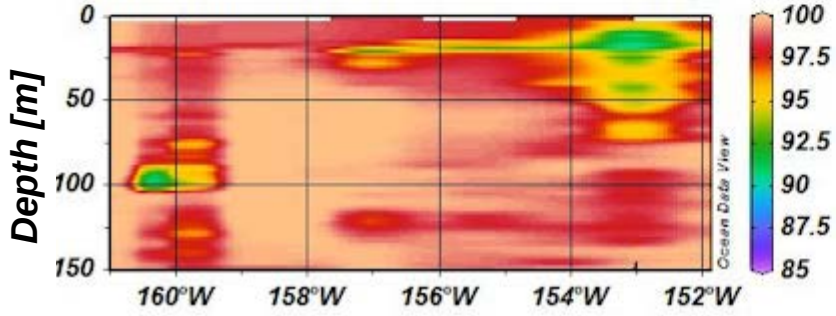
Temperature [ºC]



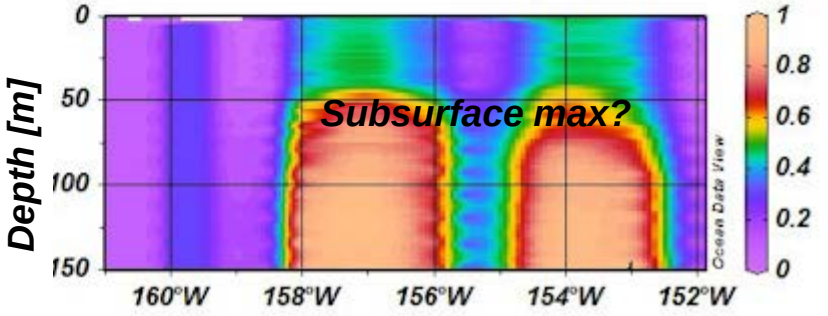
Fluorescence



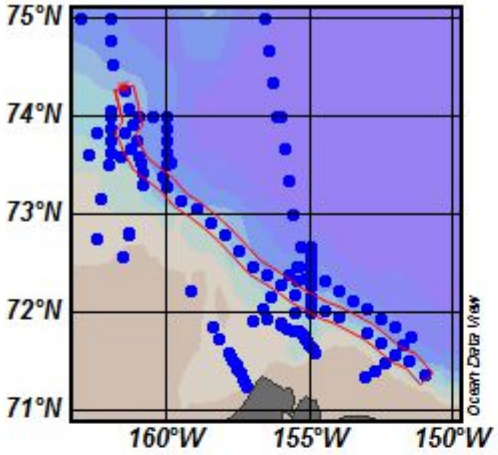
Beam Transmission [%]



Nitrate (SUNA)

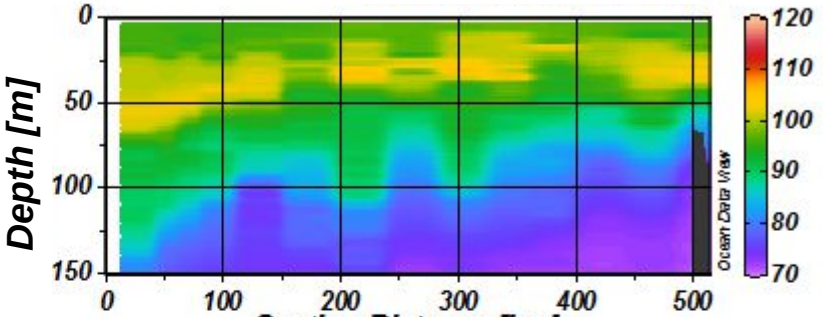


＜2017 field results＞ Vertical sections along a 500 m depth isobath

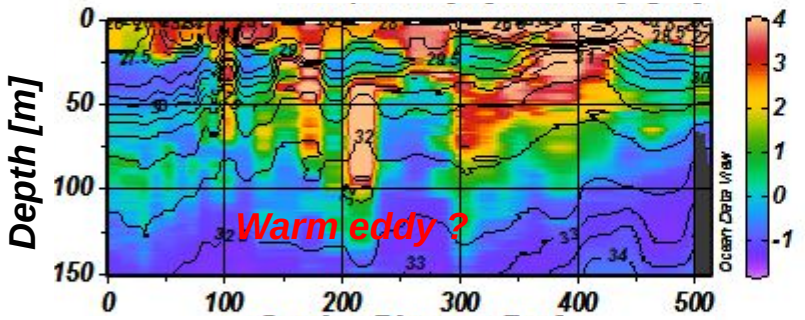


Along 500m isobath

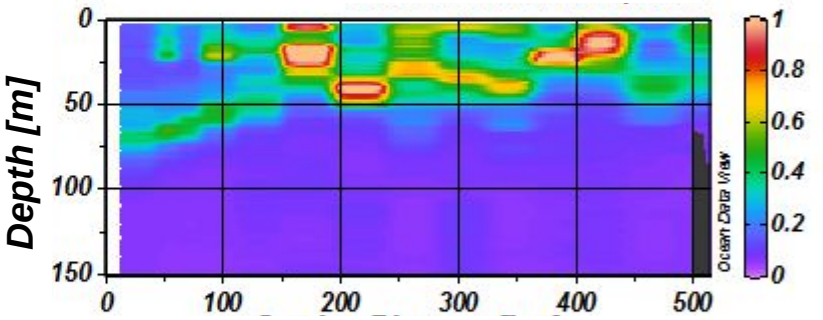
Oxygen saturation [%]



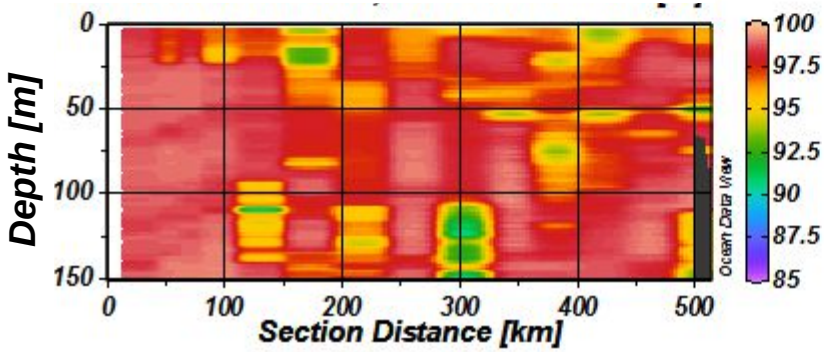
Temperature [ºC]



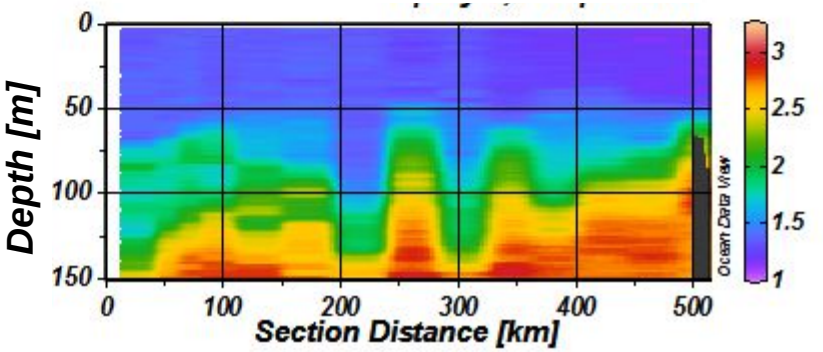
Fluorescence



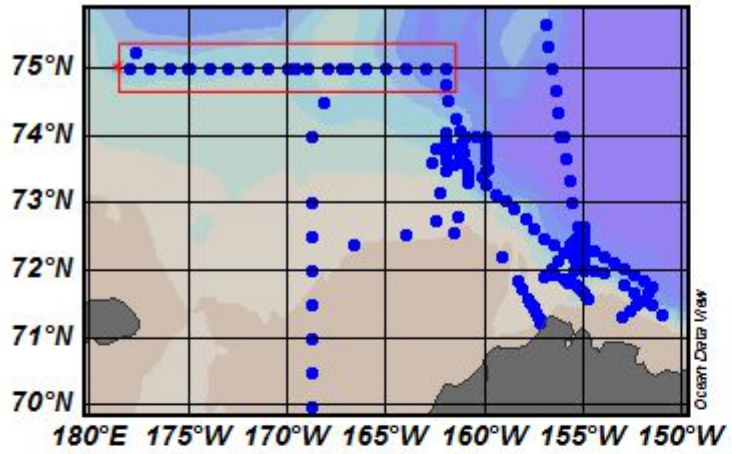
Beam Transmission [%]



Nitrate (SUNA)

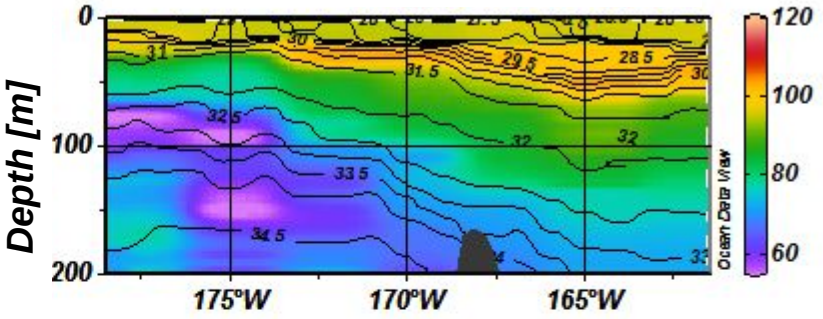


＜2017 field results＞ Vertical sections along 75°N

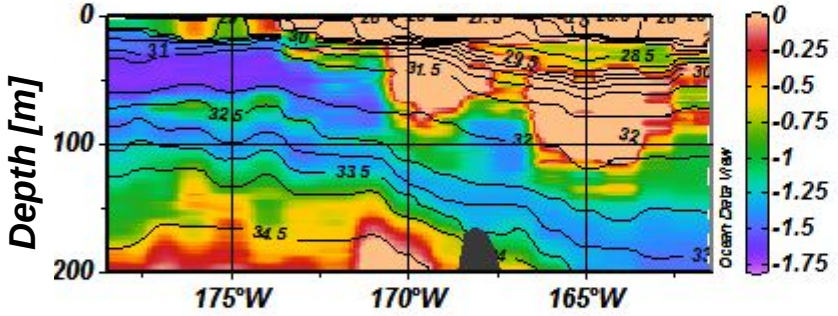


Along 75°N line

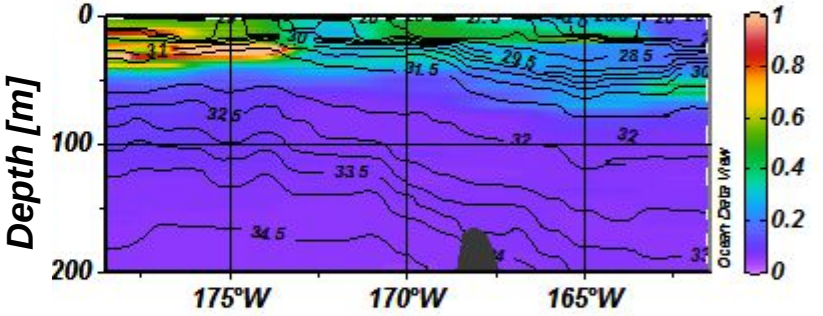
Oxygen saturation [%]



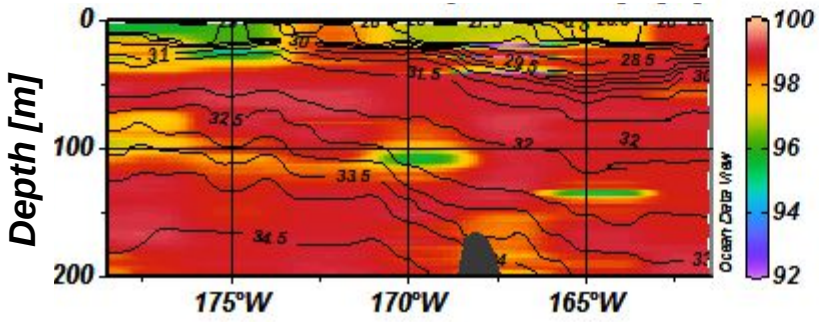
Temperature [°C]



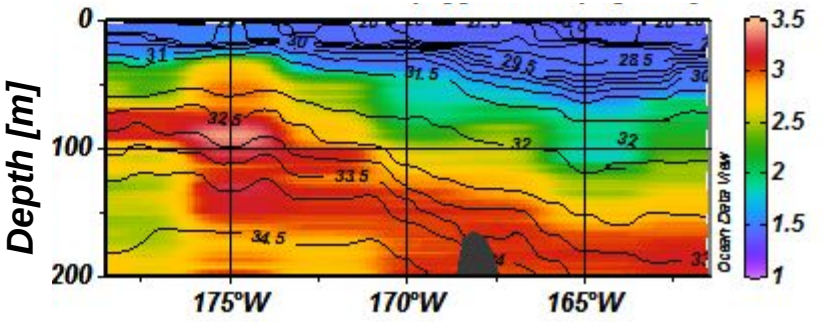
Fluorescence



Beam Transmission [%]



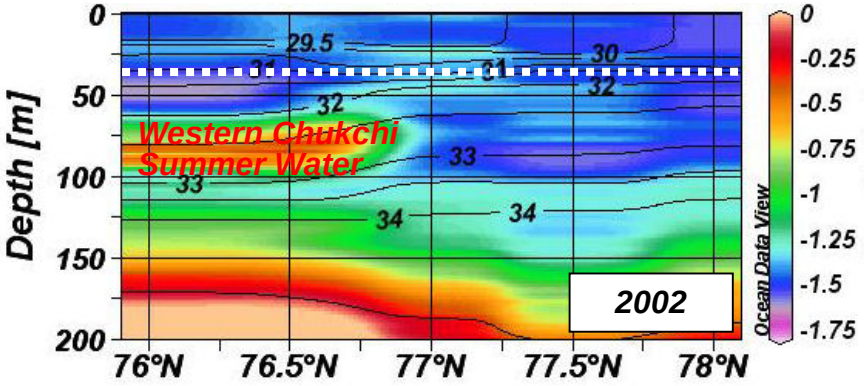
Nitrate (SUNA)



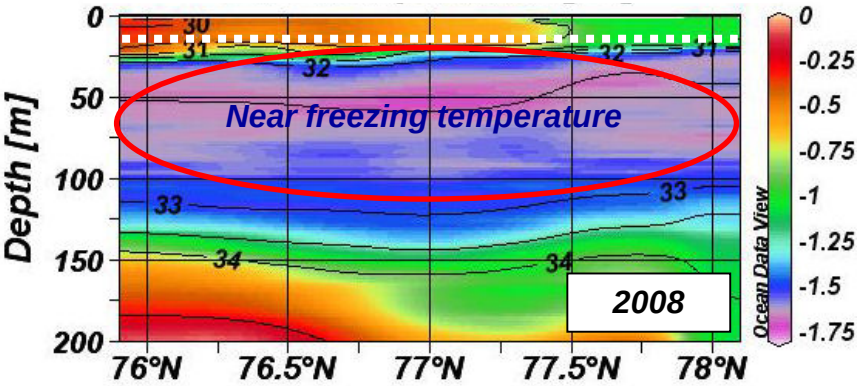
Changes in water masses due to the sea ice reduction

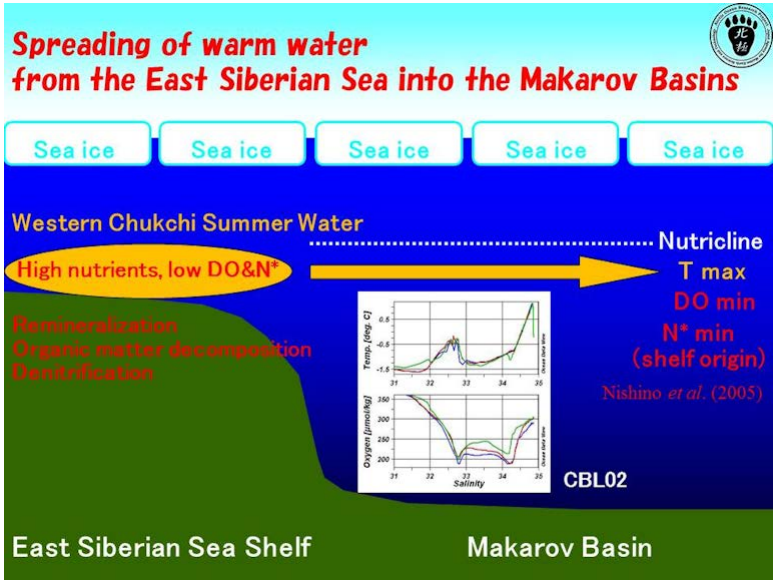
Arctic Ocean warming (Alaskan side) vs. cooling (Siberian side)
Nutricline deepening (Alaskan side) vs. shoaling (Siberian side)

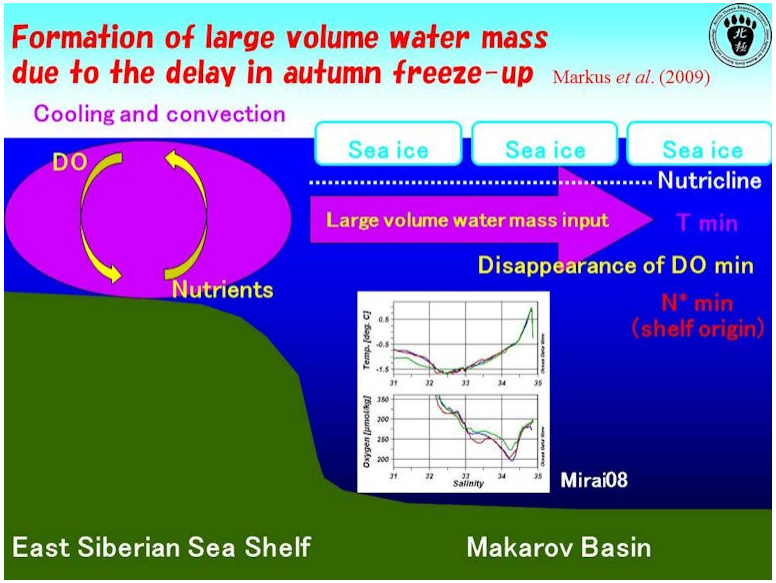
Temperature [ºC] and salinity in 2002



Temperature [ºC] and salinity in 2008



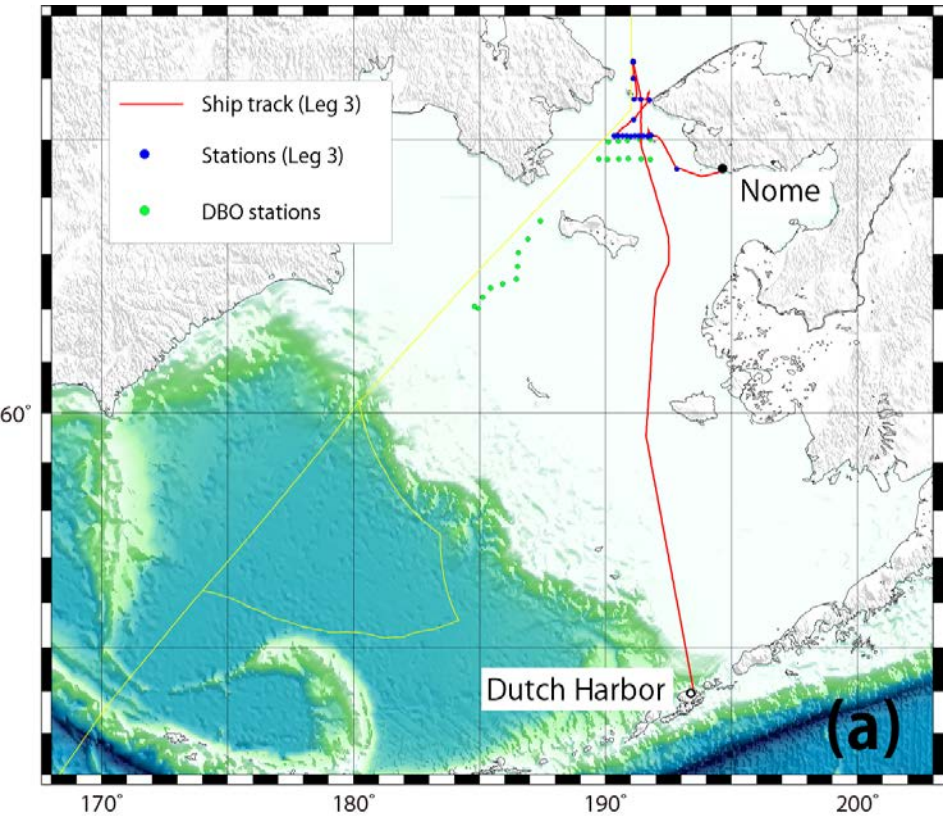


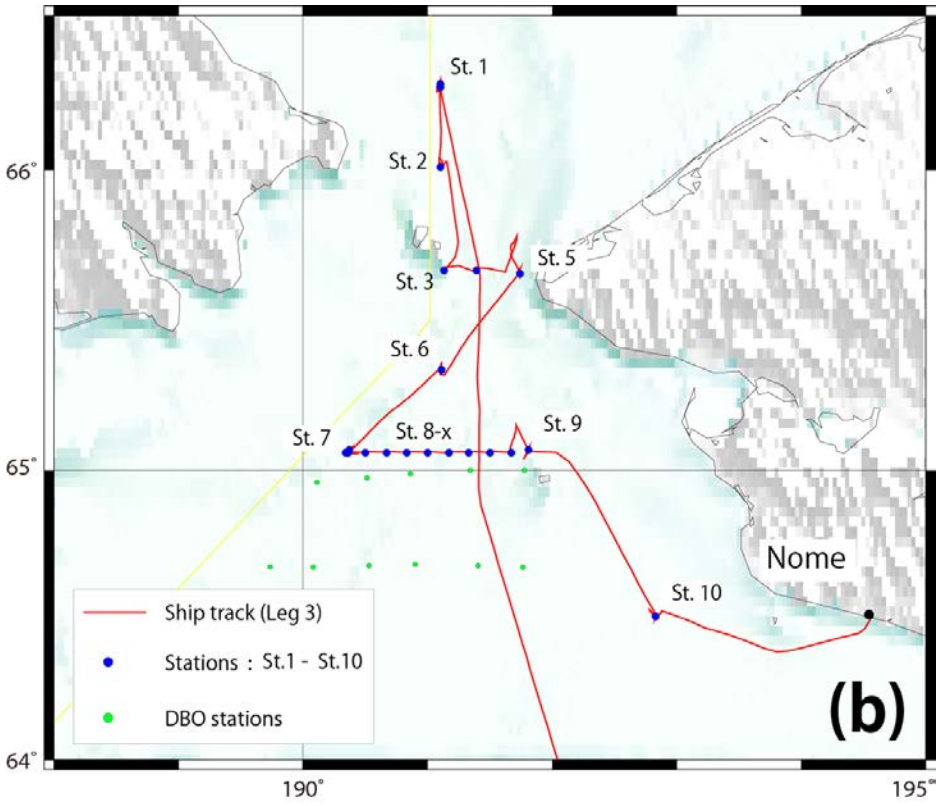


Nishino *et al*. (2013)

T/S Oshoro-Maru ArCS cruise in 2017 and planning for 2018

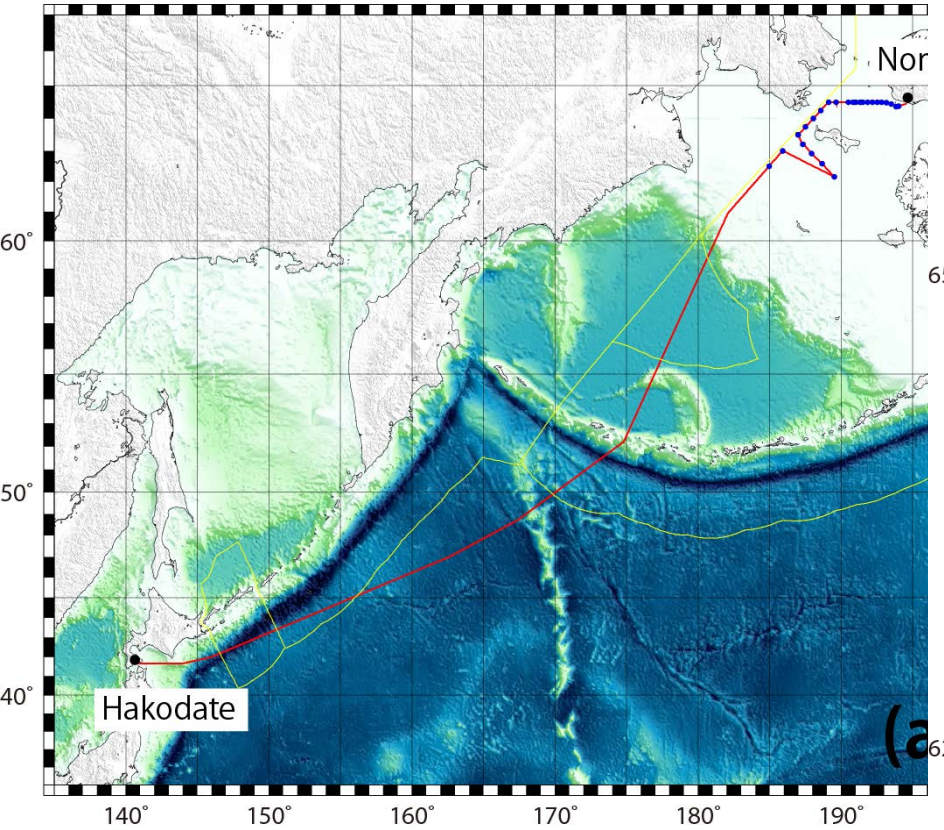
T/S Oshoro-Maru 2017
(ArCS project)

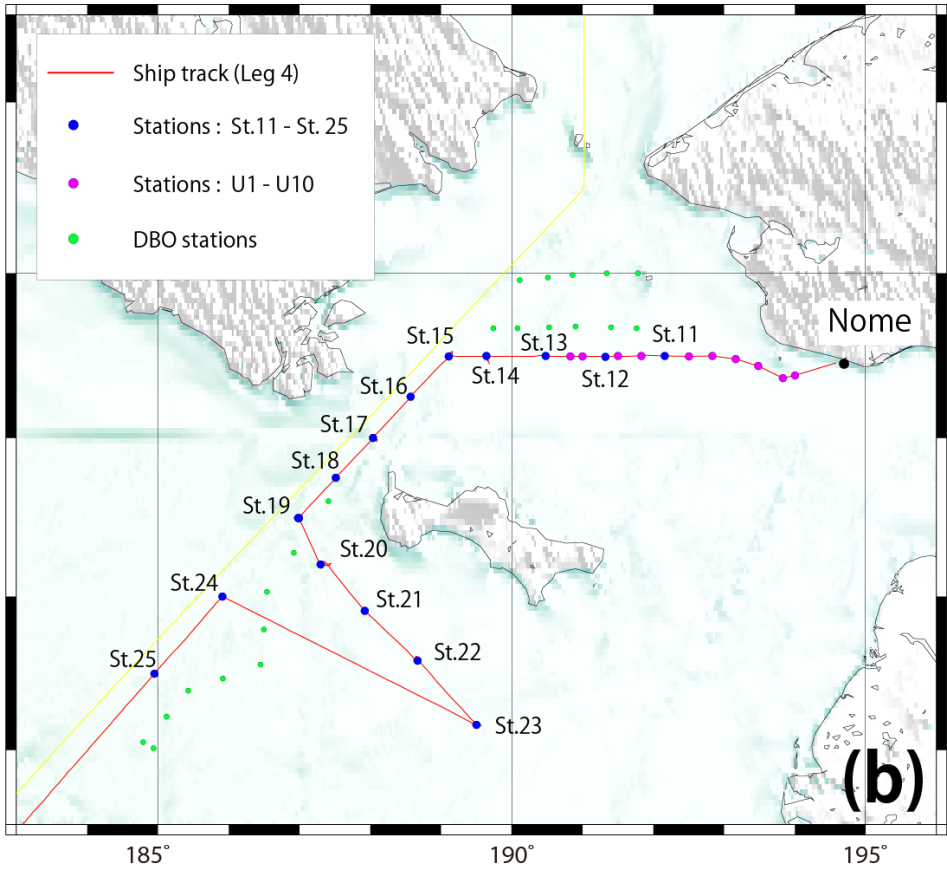




July 6 Departure from the UNISEA dock of Dutch Harbor
July 6-14 Observations for Leg-3
July 14 Arrival at Nome port

T/S Oshoro-Maru 2017
(ArCS project)





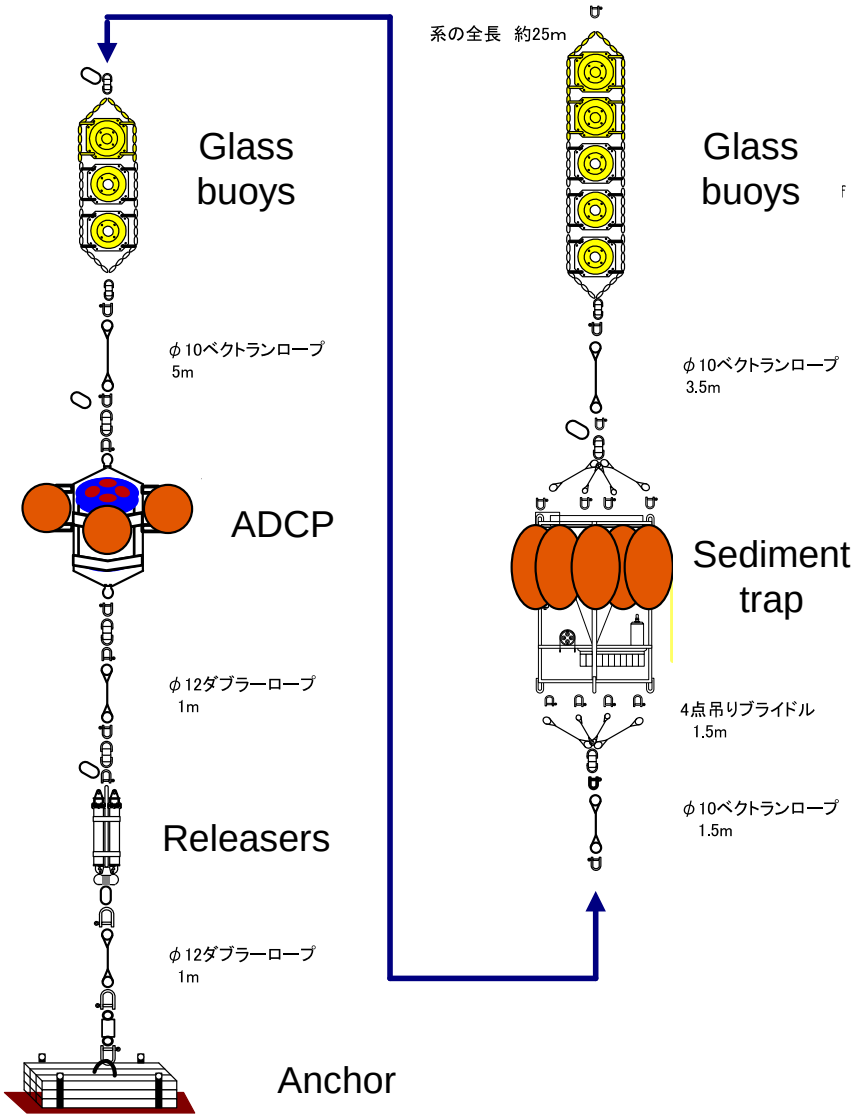
July 16 Departure from Nome port
July 16 - 27 Observation for Leg-4
August 2 Arrival at Hakodate port

Observations during Oshoro 2017 cruise

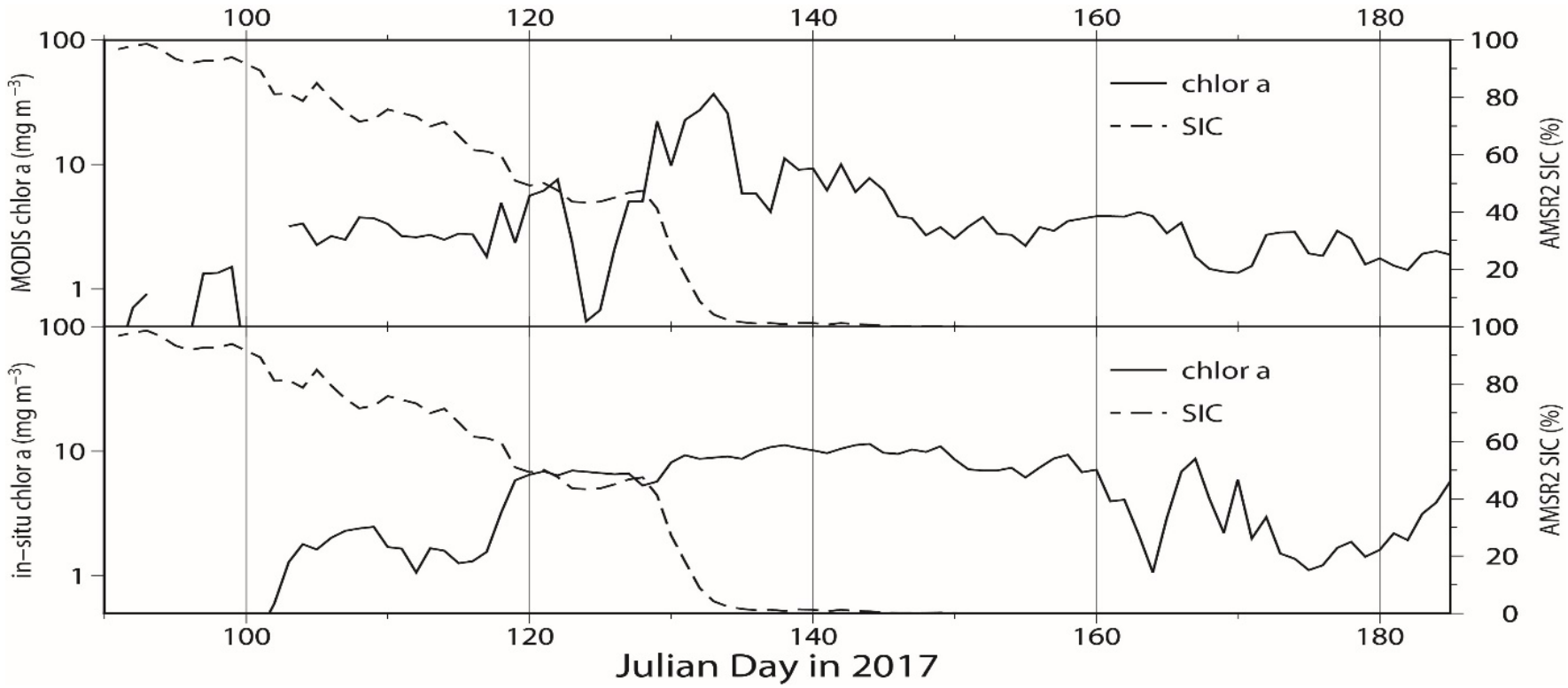
• CTD, DO, Salinity	A. Ooki and H. Ueno
• Optical properties and primary productivity	T. Hirawake
• Biogeochemistry of iodine and organic gases	A. Ooki
• Mooring recovery/re-deployment	M. Sampei
• Benthic Ecology	M. Nakaoka
• Ichtyoplankton Survey	O. Yamamura
• Marine mammal sighting survey	Y. Mitani
• Plankton	A. Yamaguchi
• Seabirds	B. Nishizawa

A part of dataset obtained near the DBO sites will be shared.
Dr. Abe will present some results of ADCP and chl/turbidity sensors on moorings at the DBO workshop.

Sediment trap diagram and photos

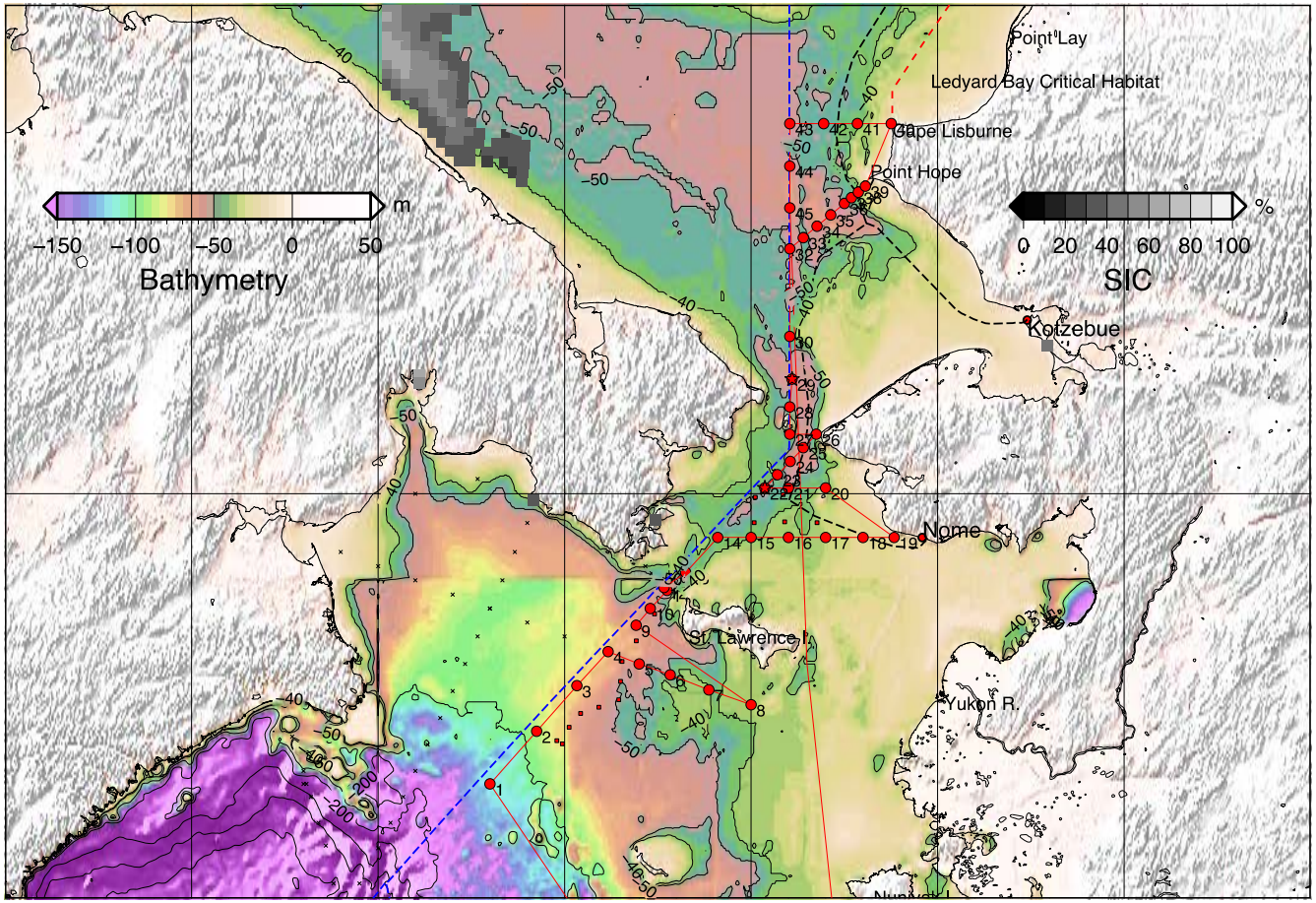


Time series of chl.a at the surface and near bottom in the BS



Time series of chlorophyll *a* concentration (mg m^{-3}, solid lines) estimated from Aqua/MODIS and moored chlorophyll fluorescence sensor together with AMSR2 sea ice concentration (%, dashed lines) at Bering Strait in 2017.

T/S Oshoro-Maru 2018
(ArCS project)



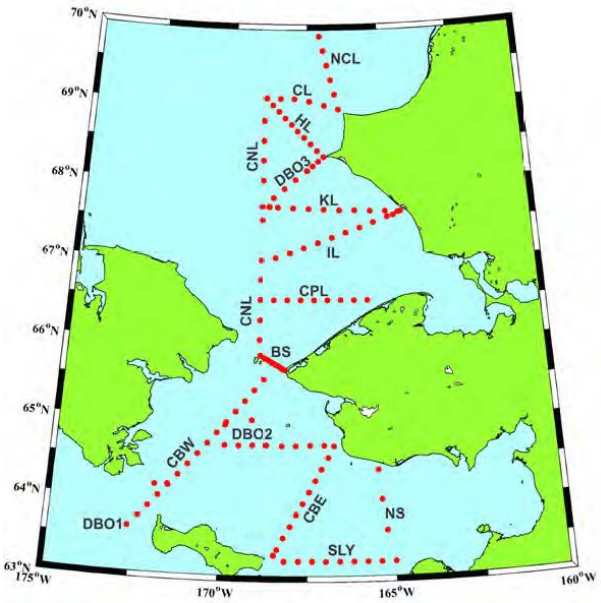
June 29–July 15, Dutch Harbor - Chukchi Sea - Dutch Harbor

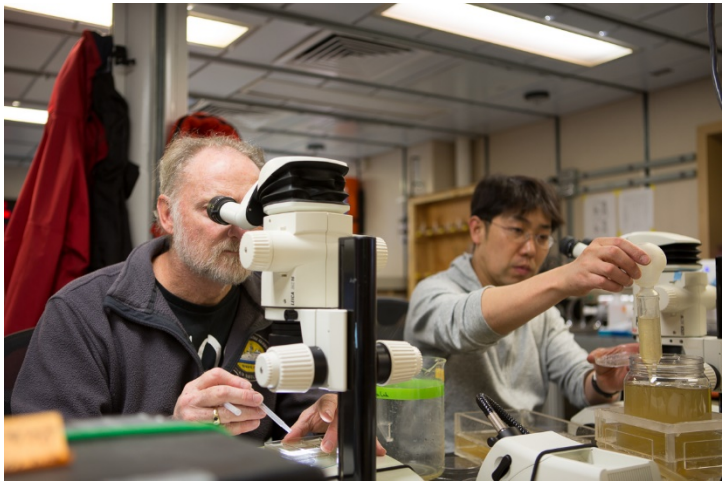
Observations and samplings during Oshoro 2018 cruise

- Observations and samplings are almost the same as those in the 2017 cruise.
- We hope to use a small beam trawl and dredge in the North Bering Sea Climate Resilience Area (NBSCRA) for sampling of benthos and demersal fish.

Other activities

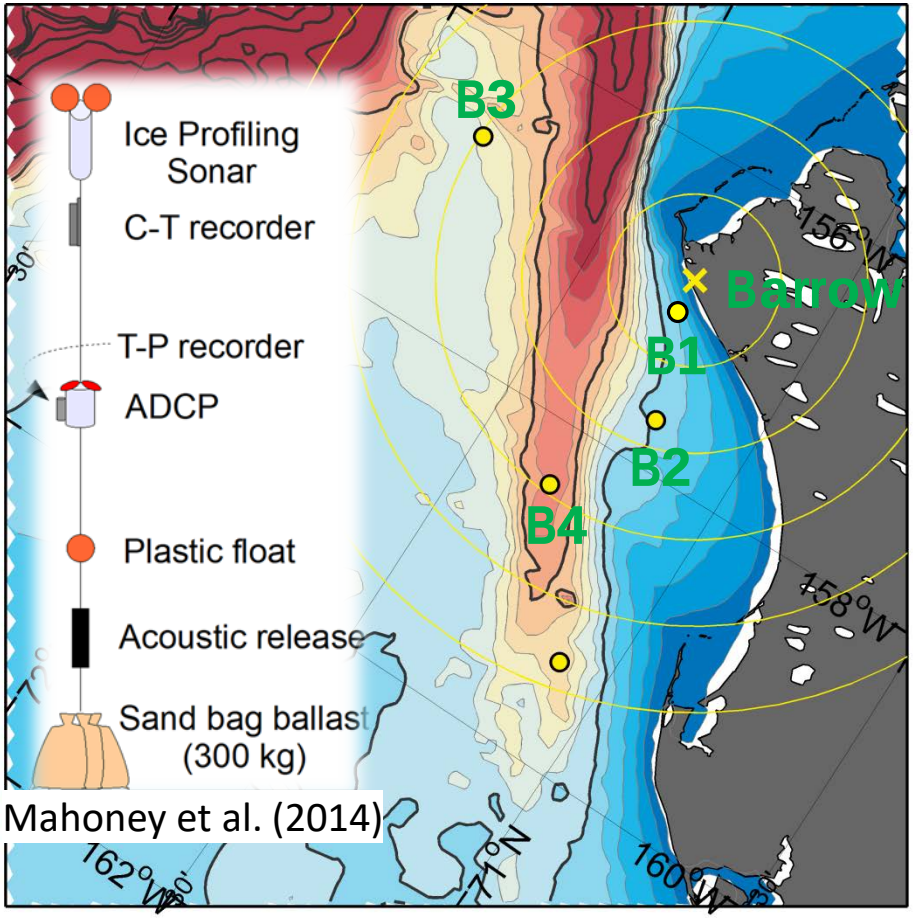
R/V *Sikuliaq* cruise (ASGARD_SKQ201709S: 9-28 June 2017)





Atsushi Yamaguchi (Hokkaido University) made zooplankton study as an international collaborator from ArCS project.

Sea-ice and Oceanographic Mooring Operations off Barrow in August 2017



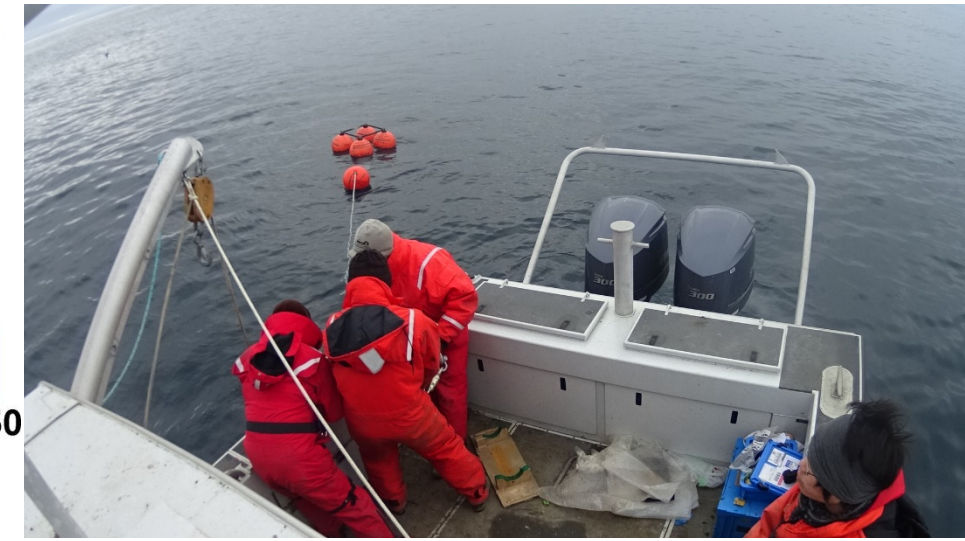
Mahoney et al. (2014)

Cooperative observation (2009-):

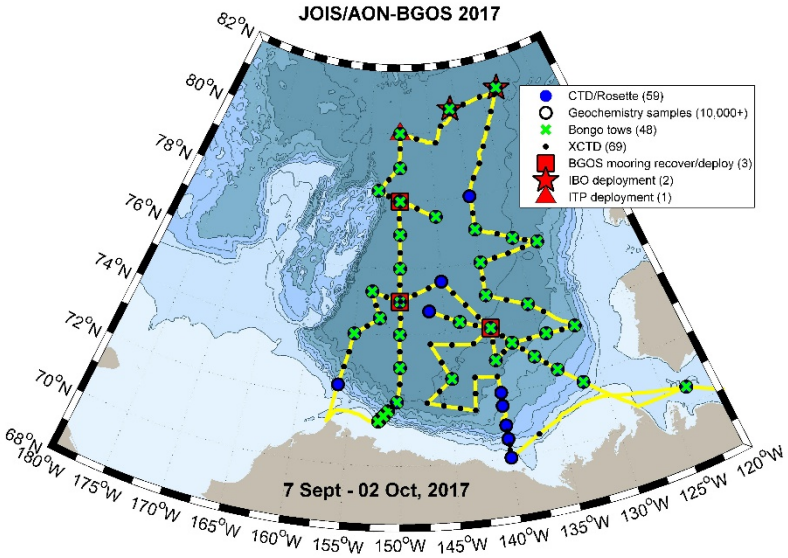
- Hokkaido University (Ohshima, Hirano, Takatsuka, Ito & Fukamachi)
- University of Alaska Fairbanks (Mahoney, Jones & Eicken)

Mooring operations

- Recoveries @ B2 & B3 (deployed in 2015)
- Deployments @ B1, B2 & B4 (will be recovered in 2019)



Recent publication based on this observation: *Fukamachi et al.* (2017, *Journal of Glaciology*)



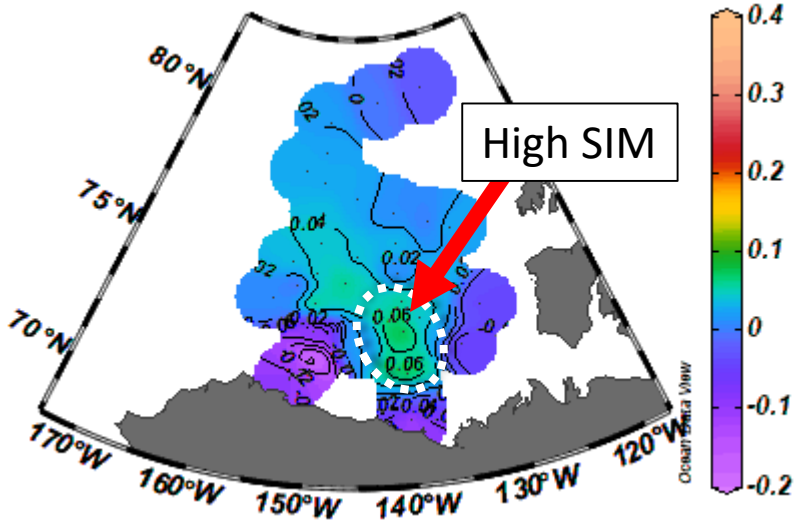
ArCS & JOIS

FW sources in the Canada Basin

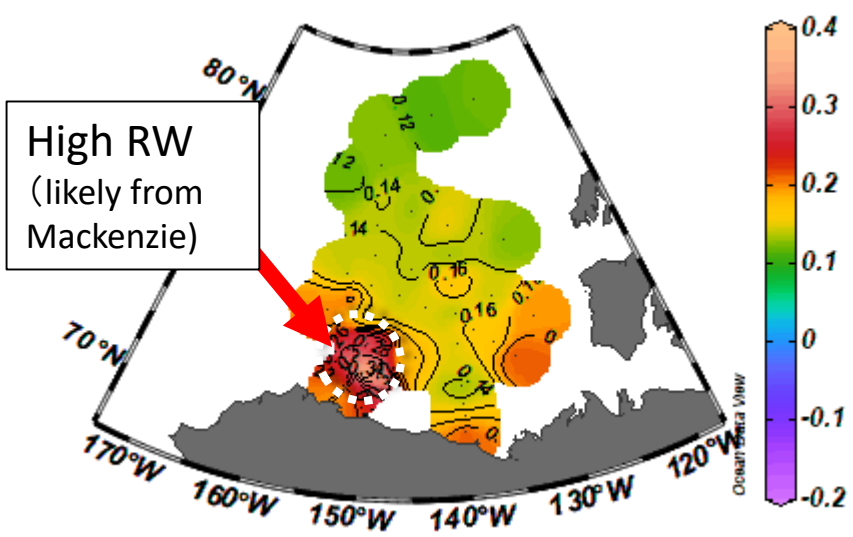
7 Sept-02 Oct, 2017

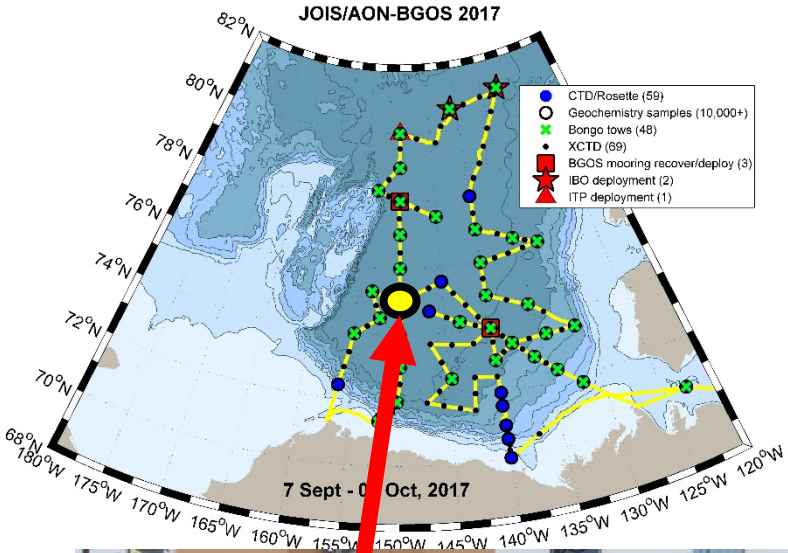
(from alkalinity, preliminary)

Sea ice meltwater fraction



River water fraction





ArCS & JOIS

Seasonal variations in FW sources & ocean acidification

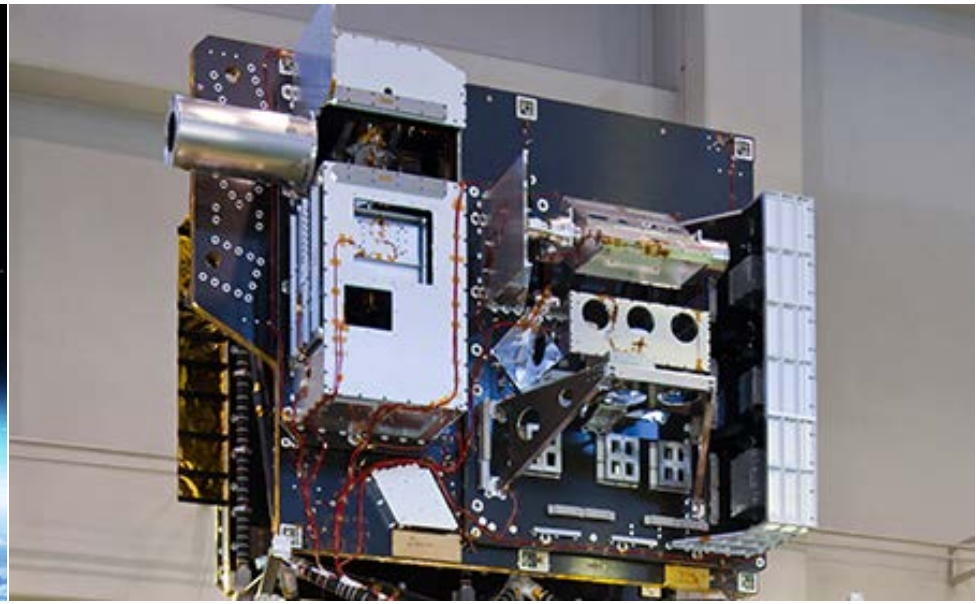
Recovery (2016-2017)
and deployment (2017-2018)

RAS (water sampler)

- Salinity
- $H_2{}^{18}O$
- Nutrients
- DIC/TA

+ CTD, Fluoro, DO sensors

SGLI/GCOM-C will be launched soon!



- Ocean color and thermal sensors
- 250 m spatial resolution in shelf region
- Chl.a, primary production, CDOM, Phytoplankton Functional Type (PFT), etc.

http://global.jaxa.jp/projects/sat/gcom_c/