

# Results observed in DBO3 by KOPRI from 2014-2017 and 2019

**Jinyoung Jung, Kyoung-Ho Cho, Youngju Lee, Eun Jin Yang, and  
Sung-Ho Kang**

**Korea Polar Research Institute, Yeonsu-gu, Incheon 21990, Republic of Korea**



**KOPRI**  
Korea Polar Research Institute

**PAG 2019 Fall meeting, Hangzhou, China**

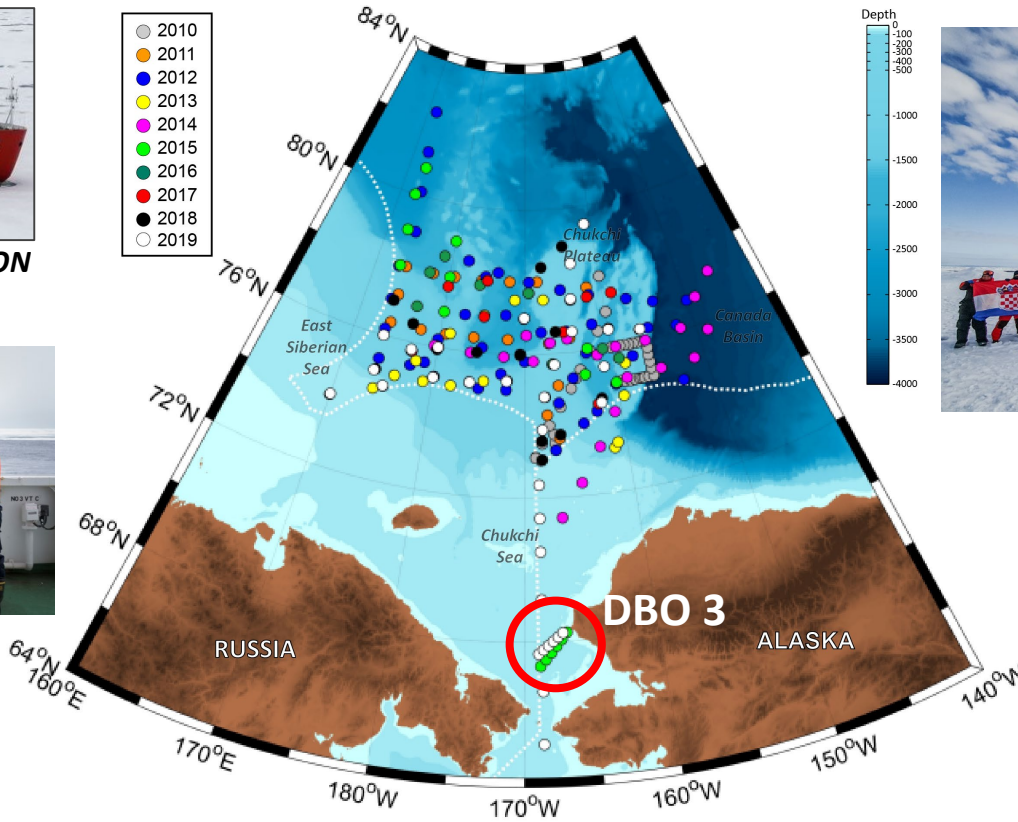
# Observations in DBO3 from 2014–2017 and 2019



Korean Icebreaker R/V ARAON



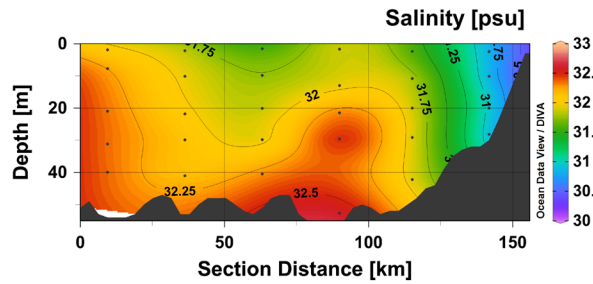
CTD rosette system



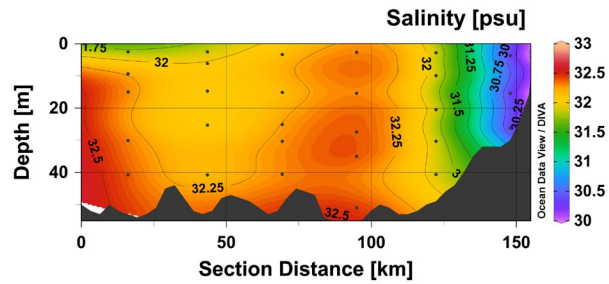
- ARA05B cruise: July 31–August 25, 2014
- ARA06B cruise: August 2–20, 2015
- ARA07B cruise: August 6–19, 2016
- ARA08B cruise: August 6–25, 2017
- ARA10B cruise: August 5–24, 2019

- Physical, chemical and biological components have been measured in DBO3 for 5 years during similar sampling periods.

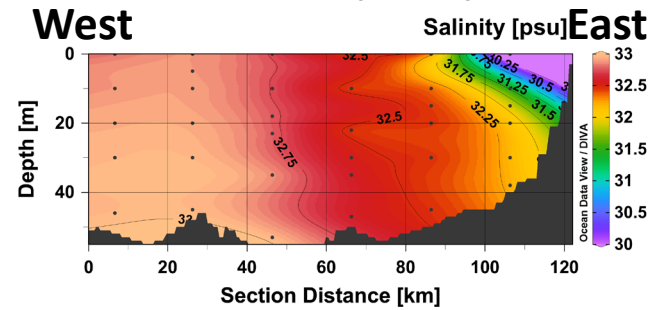
### ARA05B (2014)



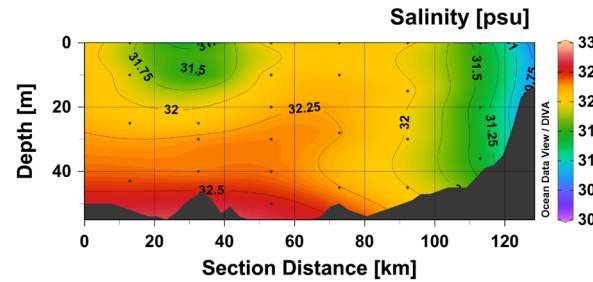
### ARA06B (2015)



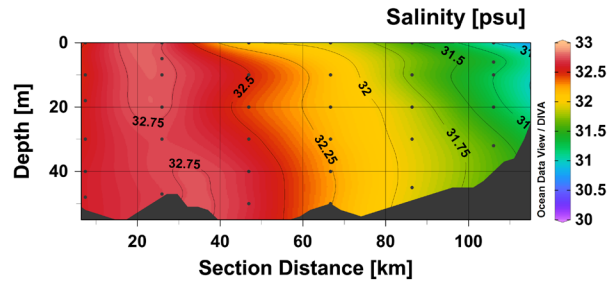
### ARA10B (2019)



### ARA07B (2016)

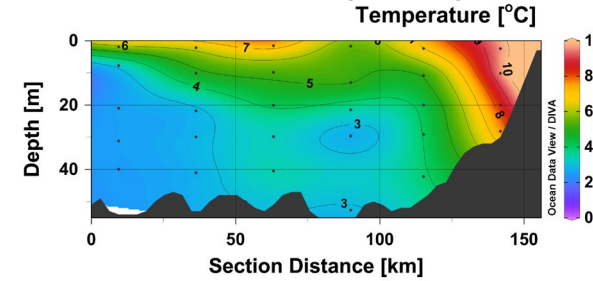


### ARA08B (2017)

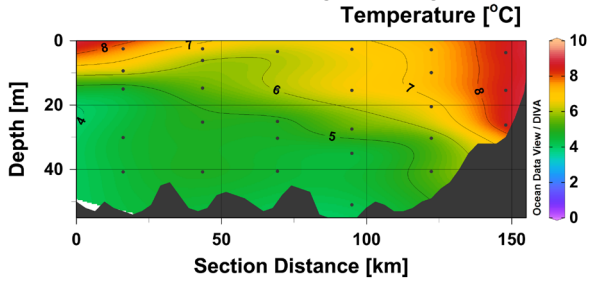


The influences of Anadyr Water and Alaska Coastal Water increased?

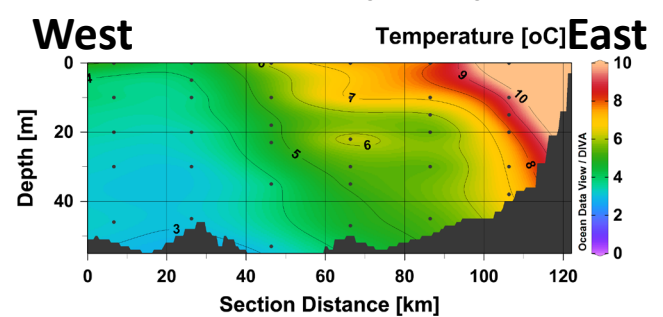
### ARA05B (2014)



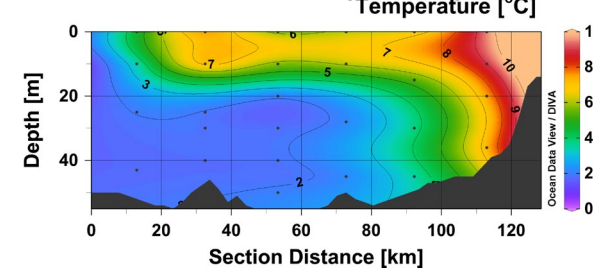
### ARA06B (2015)



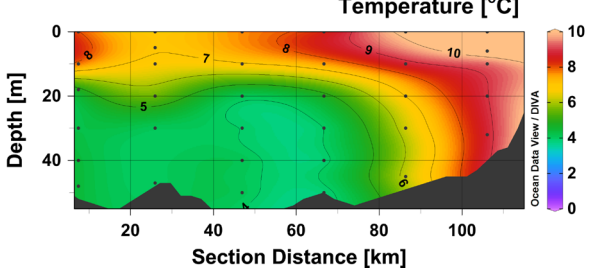
### ARA10B (2019)



### ARA07B (2016)

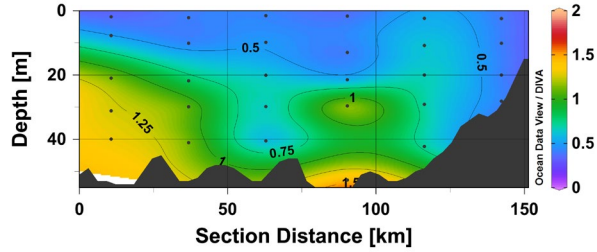


### ARA08B (2017)



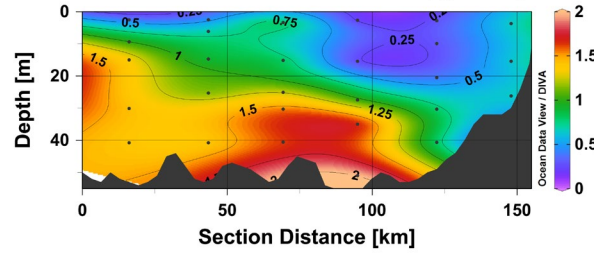
### ARA05B (2014)

PO<sub>4</sub> [μmol/L]



### ARA06B (2015)

PO<sub>4</sub> [μmol/L]

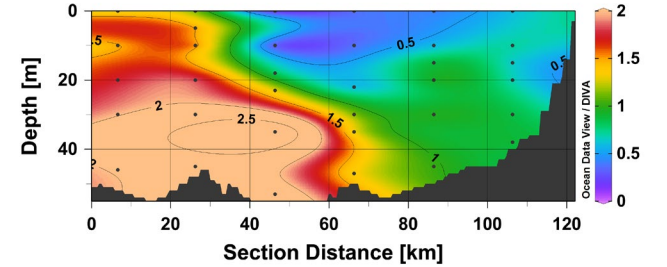


### ARA10B (2019)

West

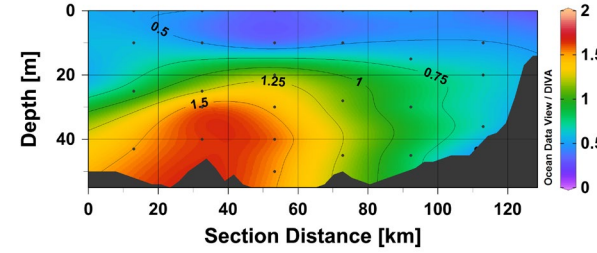
PO<sub>4</sub> [μmol/L]

East



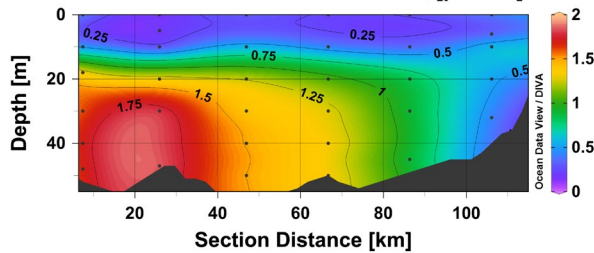
### ARA07B (2016)

PO<sub>4</sub> [μmol/L]



### ARA08B (2017)

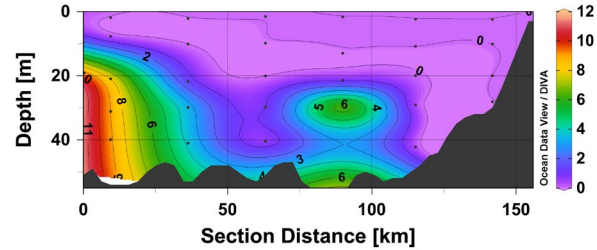
PO<sub>4</sub> [μmol/L]



The influences of Anadyr Water and Alaska Coastal Water increased?

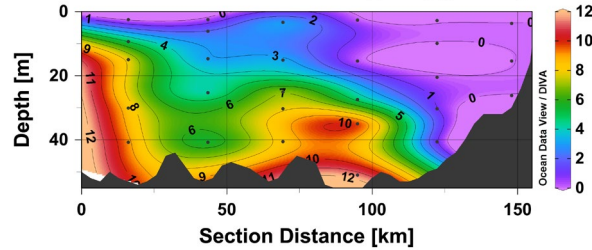
### ARA05B (2014)

NO<sub>2</sub>+NO<sub>3</sub> [μmol/L]



### ARA06B (2015)

NO<sub>2</sub>+NO<sub>3</sub> [μmol/L]

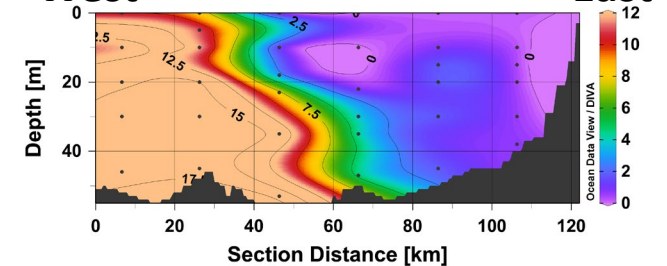


### ARA10B (2019)

West

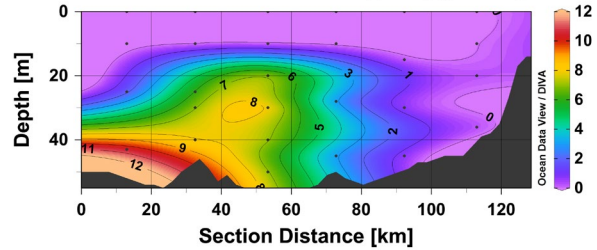
NO<sub>2</sub>+NO<sub>3</sub> [μmol/L]

East



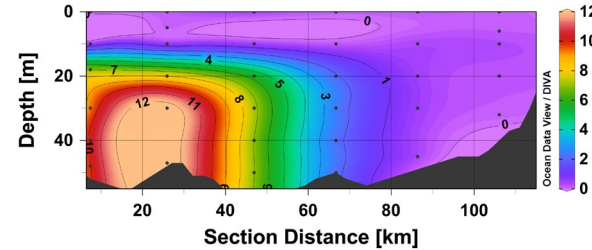
### ARA07B (2016)

NO<sub>2</sub>+NO<sub>3</sub> [μmol/L]



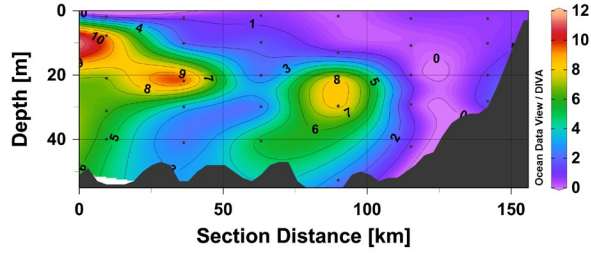
### ARA08B (2017)

NO<sub>2</sub>+NO<sub>3</sub> [μmol/L]



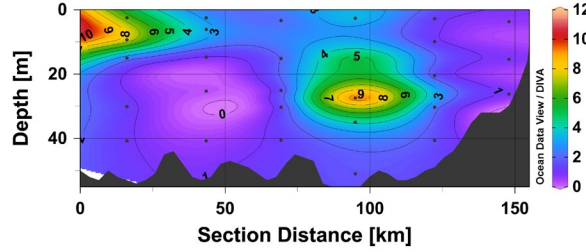
### ARA05B (2014)

Chl-a [ $\text{mg}/\text{m}^3$ ]



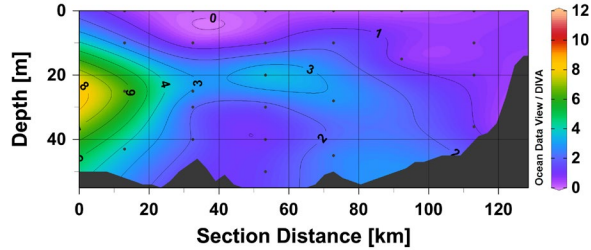
### ARA06B (2015)

Chl-a [ $\text{mg}/\text{m}^3$ ]



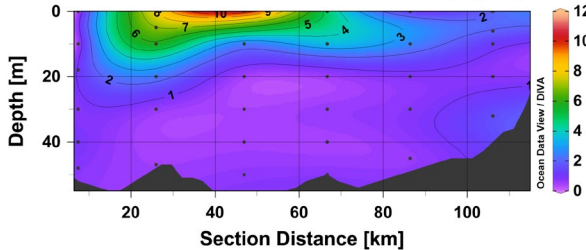
### ARA07B (2016)

Chl-a [ $\text{mg}/\text{m}^3$ ]



### ARA08B (2017)

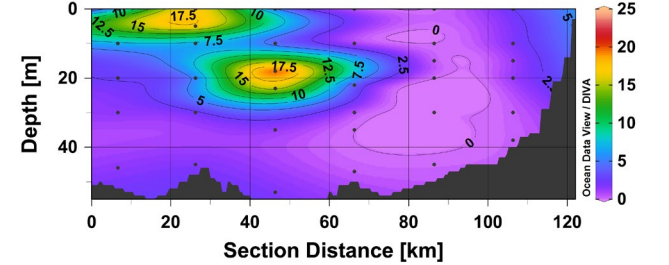
Chl-a [ $\text{mg}/\text{m}^3$ ]



### ARA10B (2019)

West

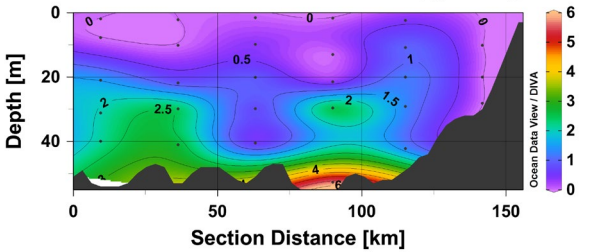
Fluorescence [ $\text{mg}/\text{m}^3$ ] East



The influences of Anadyr Water and Alaska Coastal Water increased?

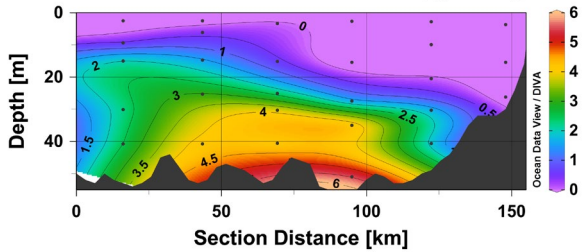
### ARA05B (2014)

$\text{NH}_4$  [ $\mu\text{mol}/\text{L}$ ]



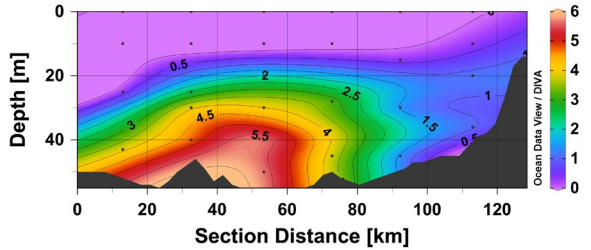
### ARA06B (2015)

$\text{NH}_4$  [ $\mu\text{mol}/\text{L}$ ]



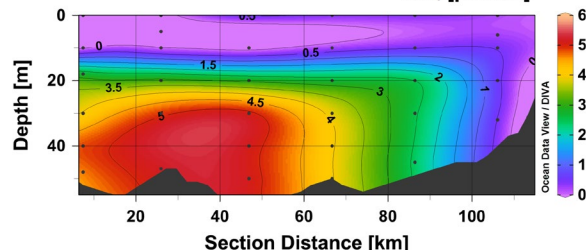
### ARA07B (2016)

$\text{NH}_4$  [ $\mu\text{mol}/\text{L}$ ]



### ARA08B (2017)

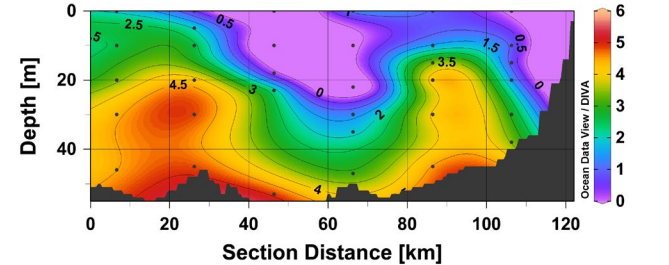
$\text{NH}_4$  [ $\mu\text{mol}/\text{L}$ ]



### ARA10B (2019)

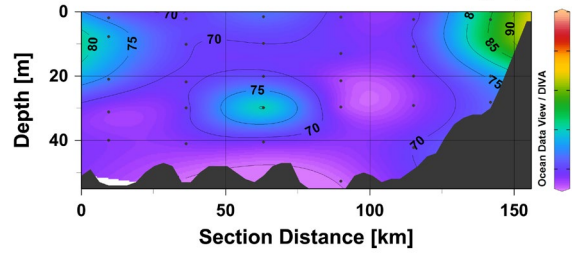
West

$\text{NH}_4$  [ $\mu\text{mol}/\text{L}$ ] East



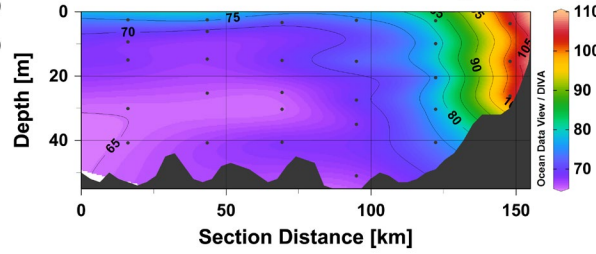
### ARA05B (2014)

DOC [ $\mu\text{M}$ ]



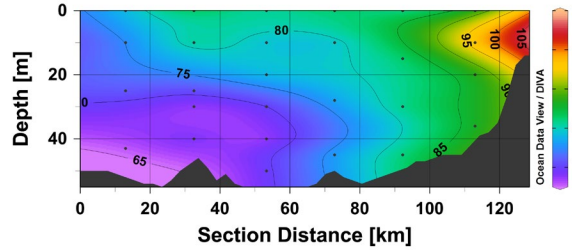
### ARA06B (2015)

DOC [ $\mu\text{M C}$ ]



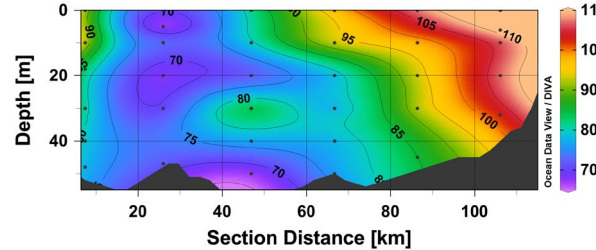
### ARA07B (2016)

DOC [ $\mu\text{M C}$ ]



### ARA08B (2017)

DOC [ $\mu\text{M C}$ ]



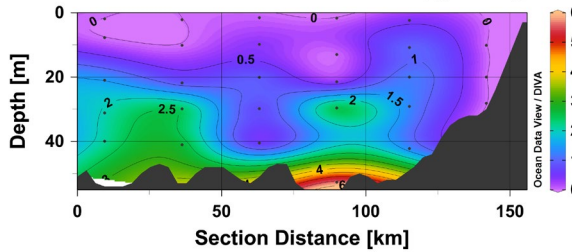
### ARA10B (2019)

Can we see more higher DOC concentration in the eastern stations????

The influences of Anadyr Water and Alaska Coastal Water increased?

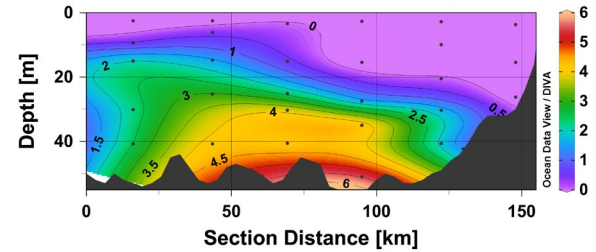
### ARA05B (2014)

$\text{NH}_4$  [ $\mu\text{mol/L}$ ]



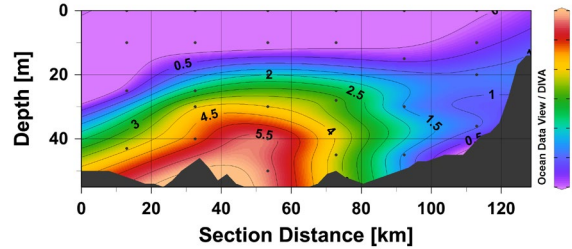
### ARA06B (2015)

$\text{NH}_4$  [ $\mu\text{mol/L}$ ]



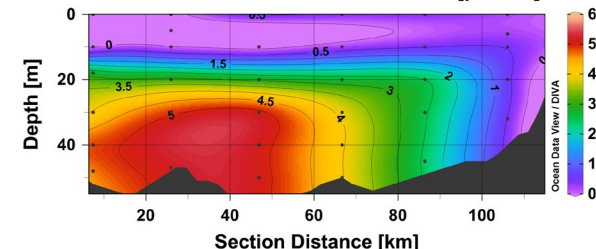
### ARA07B (2016)

$\text{NH}_4$  [ $\mu\text{mol/L}$ ]



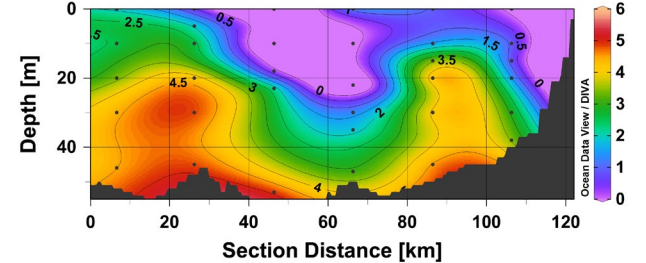
### ARA08B (2017)

$\text{NH}_4$  [ $\mu\text{mol/L}$ ]

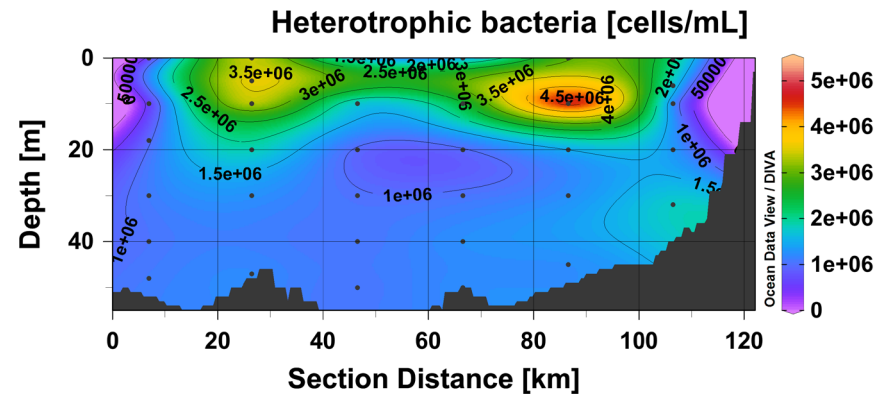
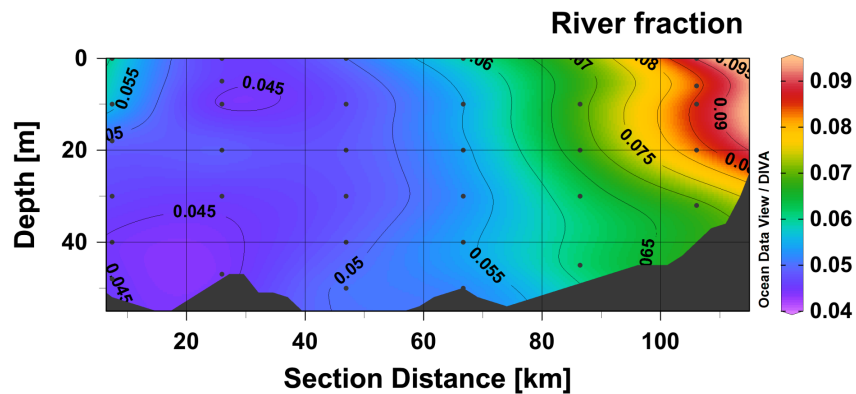
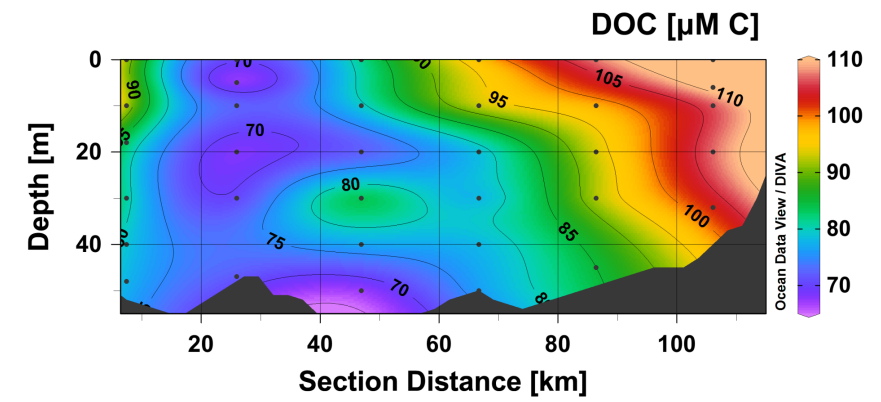
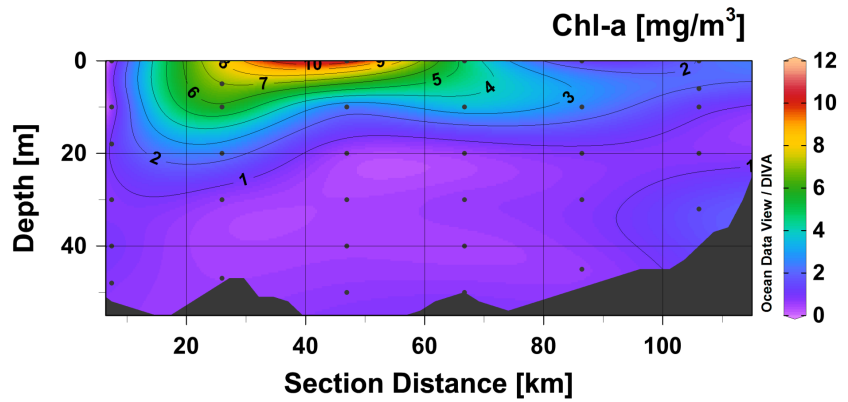
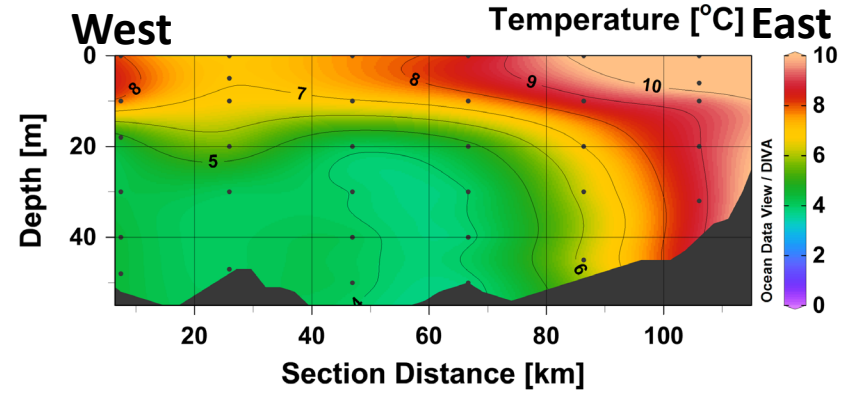
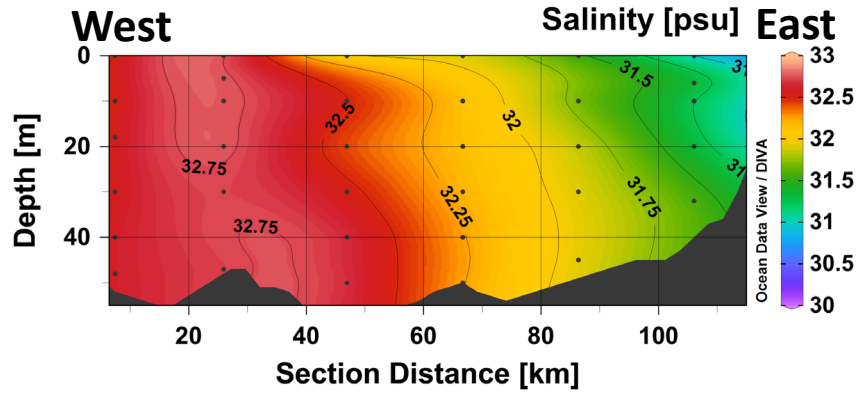


### ARA10B (2019)

West East



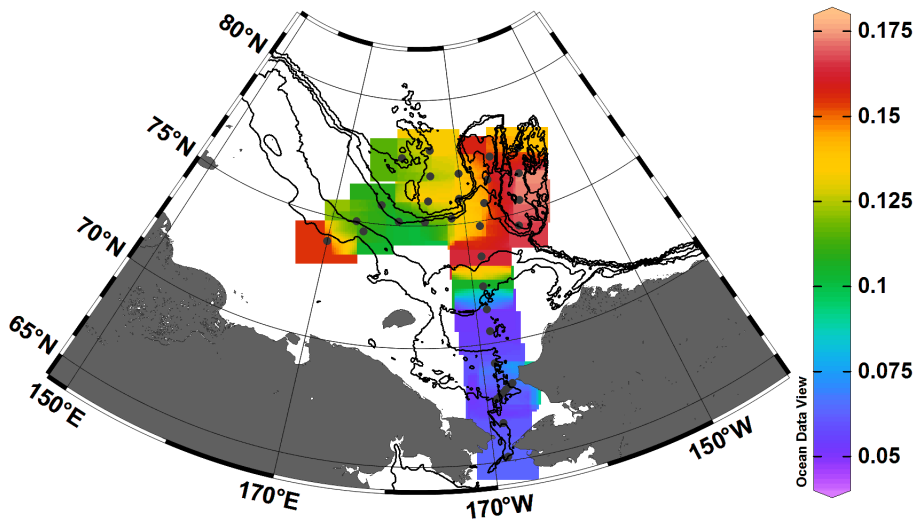
# Results observed in DBO3 in 2017



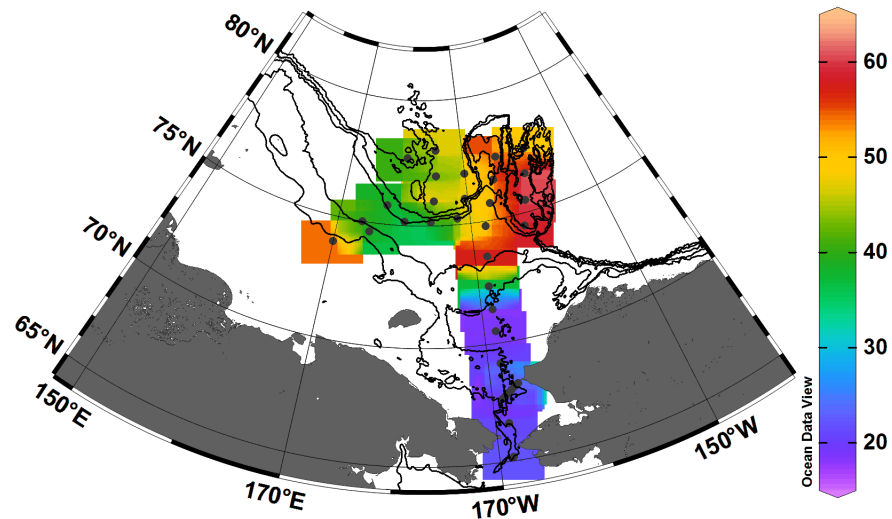
# Surface distributions of river water and its impact

ARA08B (2017)

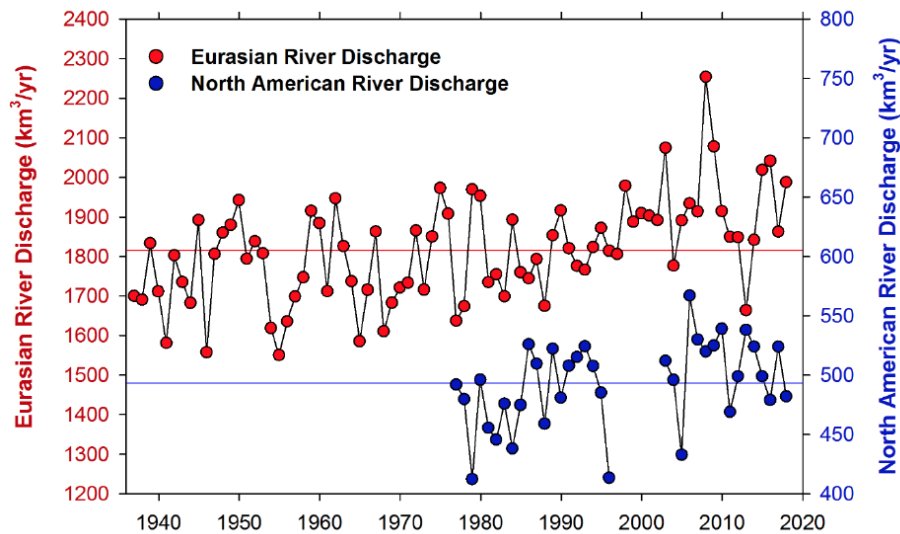
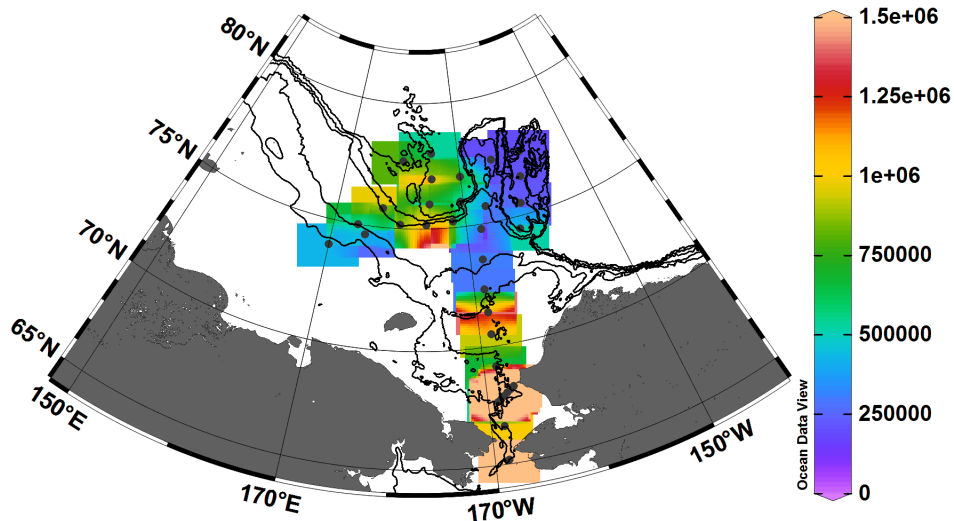
River fraction @ Depth [m]=first



Riverine DOC [ $\mu\text{M C}$ ] @ Depth [m]=first



Heterotrophic bacteria [cells/mL] @ Depth [m]=first



(Holmes et al., 2018)



# Summary

- 1. In 2019, more higher salinity and nutrients concentrations were observed in the western stations in DBO3, suggesting the influence of Anadyr Water became stronger.**
- 2. The higher nutrients concentrations observed in DBO3 could impact on the primary production in the central Arctic region.**
- 3. KOPRI's data set from 2014 to 2017 (and 2019??) shows that DOC concentration has increased in the easternmost station of DBO3, probably due to the increasing influence of Alaska Coastal Water or terrestrial DOC.**
- 4. If riverine DOC input keeps increasing, it would significantly impact on carbon cycle in the central Arctic Ocean.**
- 5. Therefore, long-term monitoring observation is required to understand environmental change in the Arctic Ocean.**

# 2020 Araon Arctic Expedition Plan

- August, 1~25, 2020  
(date is not confirmed yet)
- Nome to Barrow
- Will collaborate with DBO, SAS, SODA(C-PIES) in 2020

