

# Spatial-temporal variations in dinoflagellate cyst records of the Chukchi margin sediments: implications for paleoceanographic changes



극지연구소 극지기후연구부

김소영, 남승일



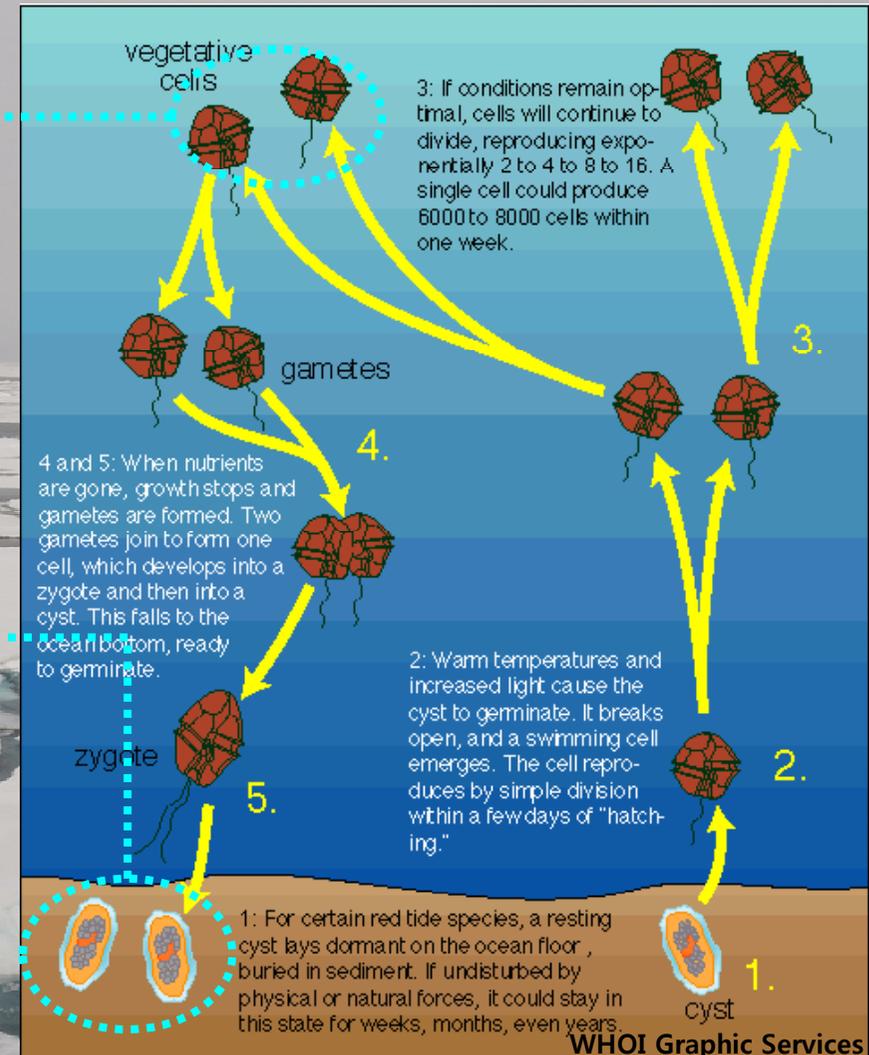
## Research Tool

### DINOFLAGELLATE

- Microscopic unicellular organisms
- One of the major groups of microplankton
- Present in all aquatic environments
- More than 2100 marine species of dinoflagellates (ca. 10% produce 'CYST', a benthic resting stage)

### DINOFLAGELLATE CYST

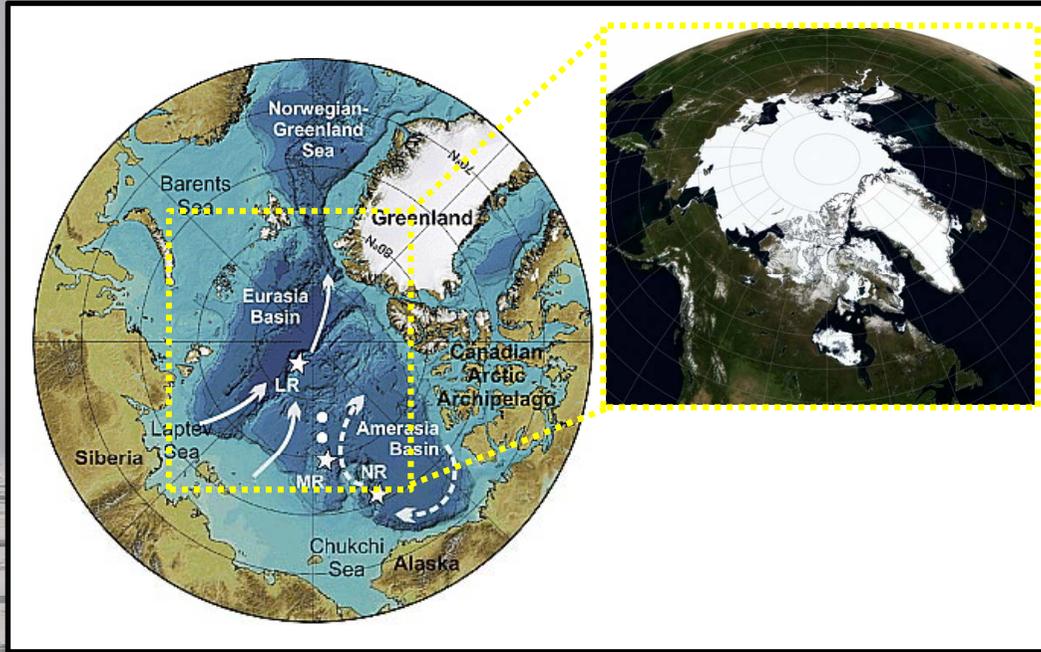
- Thick cyst wall: extremely resistant to physical, chemical breakdown
- Fossilizable
- Size: 30~65  $\mu\text{m}$
- Act like fine particles







# Research Background



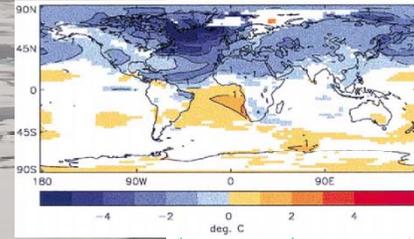
## 종합 "동장군·폭설 원인은 북극진동"...1월에도 계속될 것

기사분문 SNS댓글 쓰기 **우리가족** 임속건강 지키미, 올케어 구강세정기

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최근 지구촌에 이어지는 한파와 폭설의 원인이 북극진동의 영향인 것으로 밝혀졌다.

2월 기상청은 "북극의 기온이 평년보다 약 10도 높은 상태가 지속되며(북극진동), 북극의 매우 찬 공기가 중위도까지 남하하여 북미, 유럽, 동아시아에서 한파와 폭설을 유발하고 있다"고 밝혔다.



북극진동은 북극에 존재하는 찬 공기의 소용돌이가 수심일 또는 수심년 주기로 양악을 되풀이하는 현상으로, 이 변동을 지수화 한 것을 뜻한다.

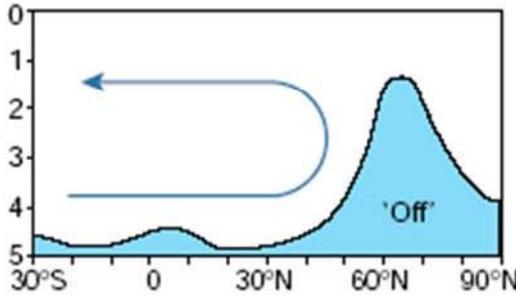
실제 북극진동의 영향으로 영국에는 100년만에 한파와 17년만의 최악의 폭설이 내렸다. 또 미국 중서부에서 시작된 기록적인 폭설과 한파가 동남부까지 강타 하는가 하면 중국 북부에서는 평년보다 10도나 낮은 한파와 폭설이 내리는 등 지구촌은 동장군의 맹위로 꼼꼼 얼어있는 상태다.

우리나라는 동아시아 대륙으로부터 저기압의 이동통로가 형

## Fresh angle on the polar seesaw

Trond M. Dokken and Kerim H. Nisancioglu

During the last glacial period, climatic variation in the Northern and Southern Hemispheres was evidently linked. Modelling work points to freshwater discharge into the North Atlantic as a driving factor.



**PALAEO**

Contrasting glacial/interglacial regimes in the western Arctic Ocean as exemplified by a sedimentary record from the Mendeleev Ridge

Leonid Polyak<sup>1,2</sup>, William B. Curry<sup>3</sup>, Dennis A. Dethy<sup>4</sup>, Jens Brackley<sup>5</sup>, Thomas M. Cronin<sup>6</sup>

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<sup>2</sup> Program in Oceanography, Boston University, Boston, MA 02215, USA  
<sup>3</sup> School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA 30332, USA  
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<sup>5</sup> School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA 30332, USA  
<sup>6</sup> School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA 30332, USA

**Abstract**

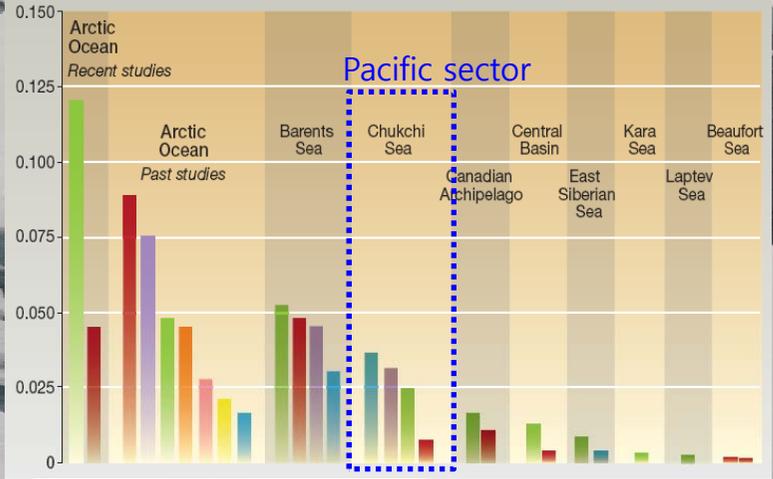
Recent studies in stratigraphy and sedimentation in western Arctic Ocean from the Mendeleev Ridge in the western Arctic Ocean reveal shifts in 1.5 km below seafloor glacial/interglacial sedimentary systems. We conclude that during these glacial/interglacial cycles, meltwater pulses from the western Arctic Ocean and in addition, the meltwater pulses from the Mendeleev Ridge, likely to be linked to the meltwater pulses from the Canadian Basin. We present a sedimentary record from the Mendeleev Ridge, which is linked to the meltwater pulses from the Canadian Basin. This record shows that during the last glacial period, the meltwater pulses from the Canadian Basin were linked to the meltwater pulses from the Mendeleev Ridge. This record shows that during the last glacial period, the meltwater pulses from the Canadian Basin were linked to the meltwater pulses from the Mendeleev Ridge. This record shows that during the last glacial period, the meltwater pulses from the Canadian Basin were linked to the meltwater pulses from the Mendeleev Ridge.

**1. Introduction**

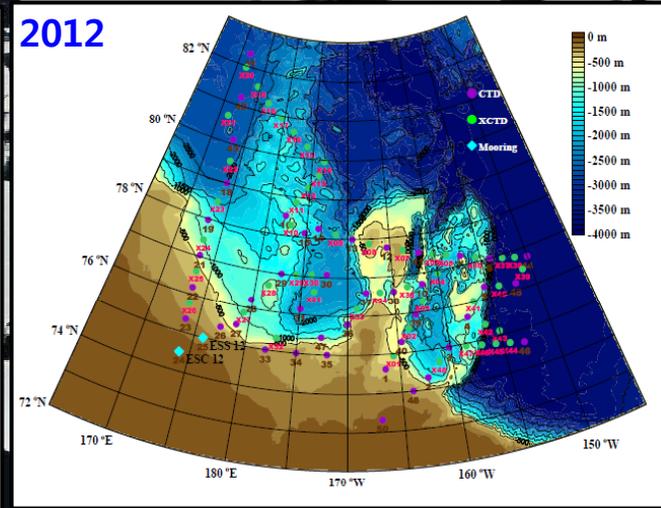
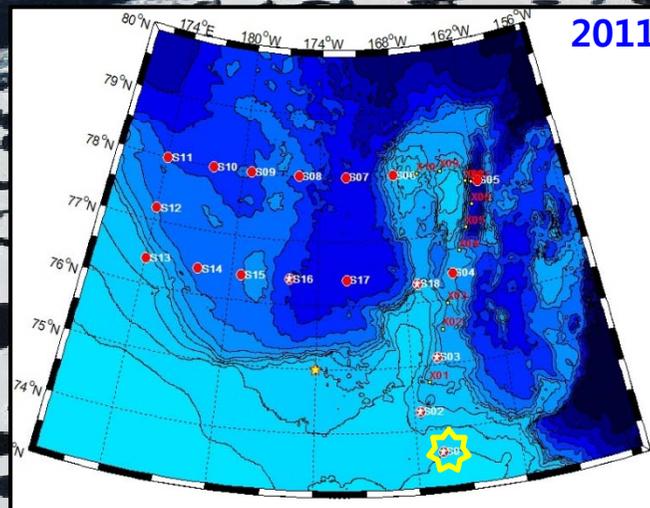
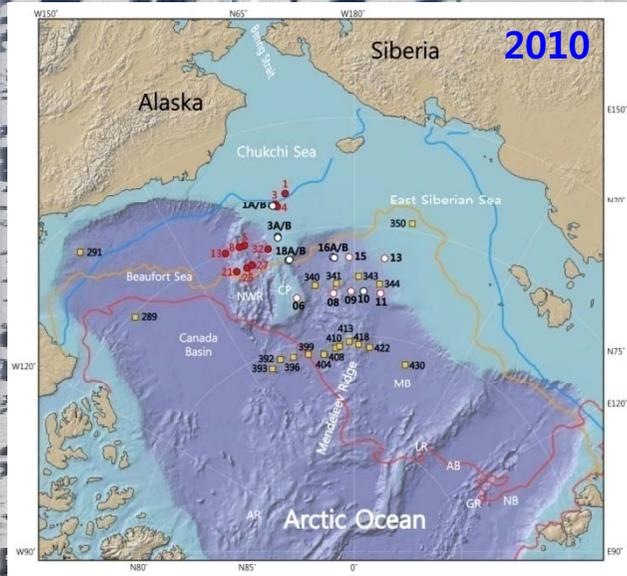
The Arctic Ocean plays a major role in the last glacial period of the Earth's environmental

## Uptake of carbon dioxide from the atmosphere

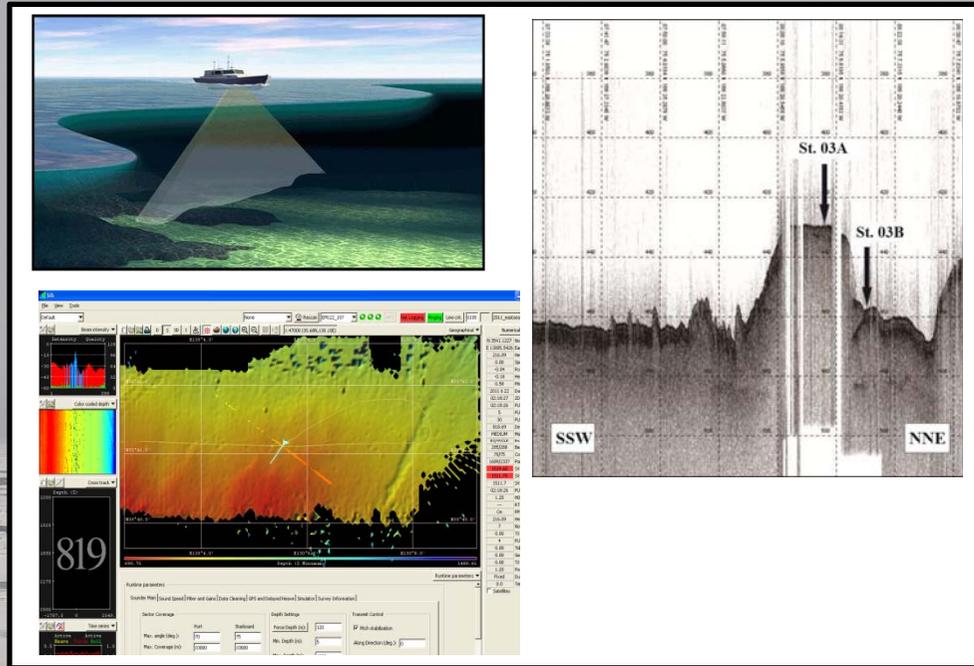
Gigatonnes of carbon per year



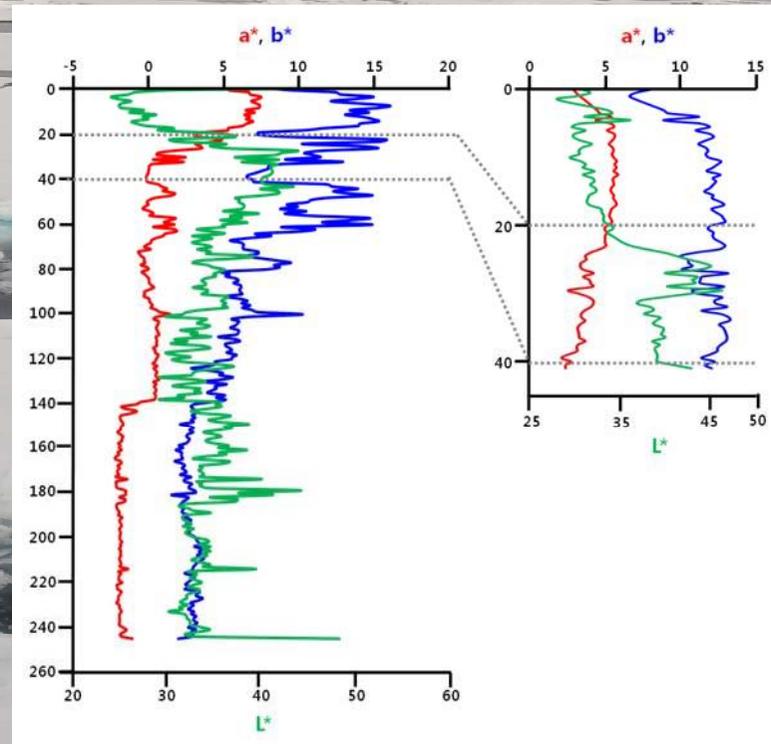
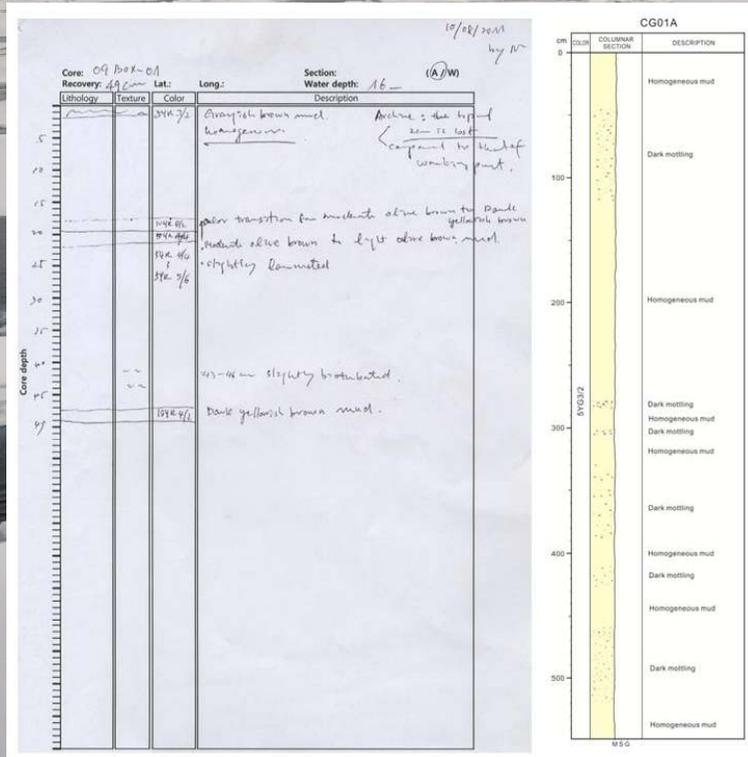
# ARAON 'western Arctic' expedition (2010~)



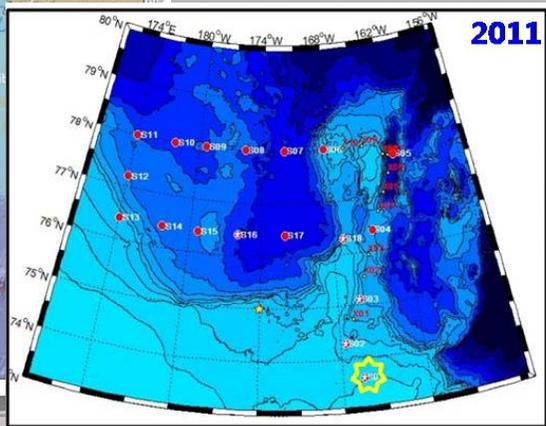
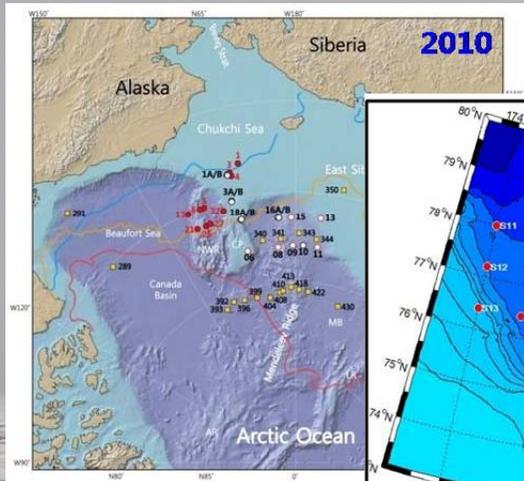
# ARAON 'western Arctic' expedition



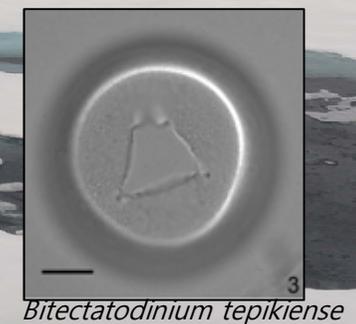
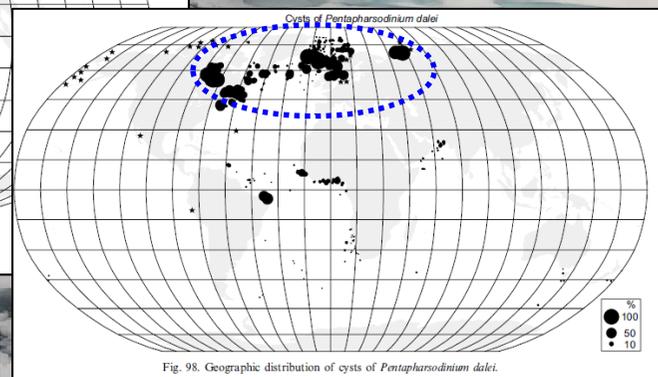
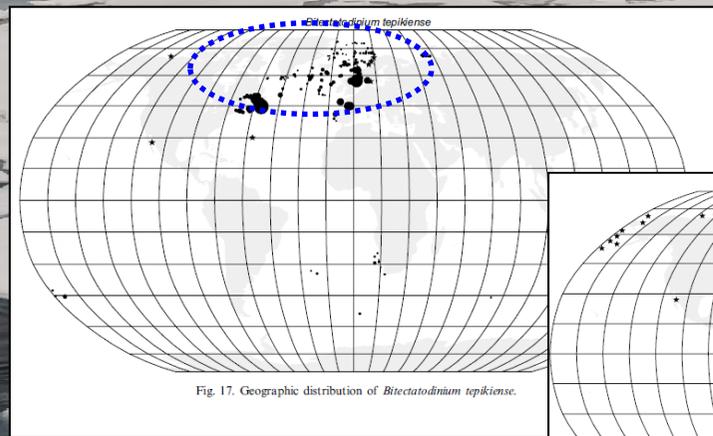
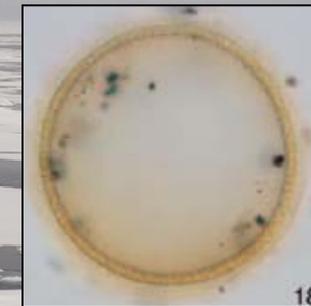
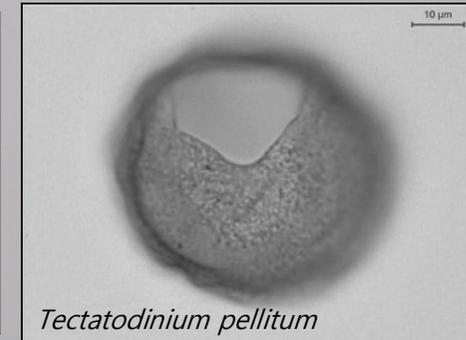
# ARAON 'western Arctic' expedition



# Preliminary results



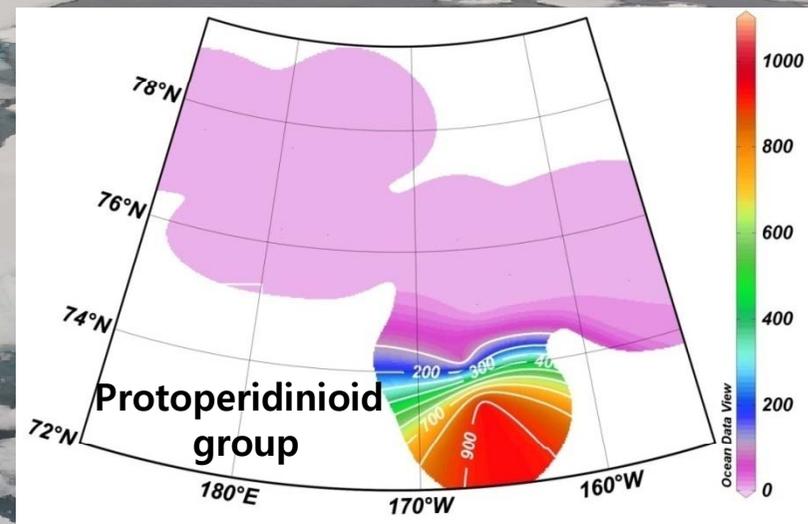
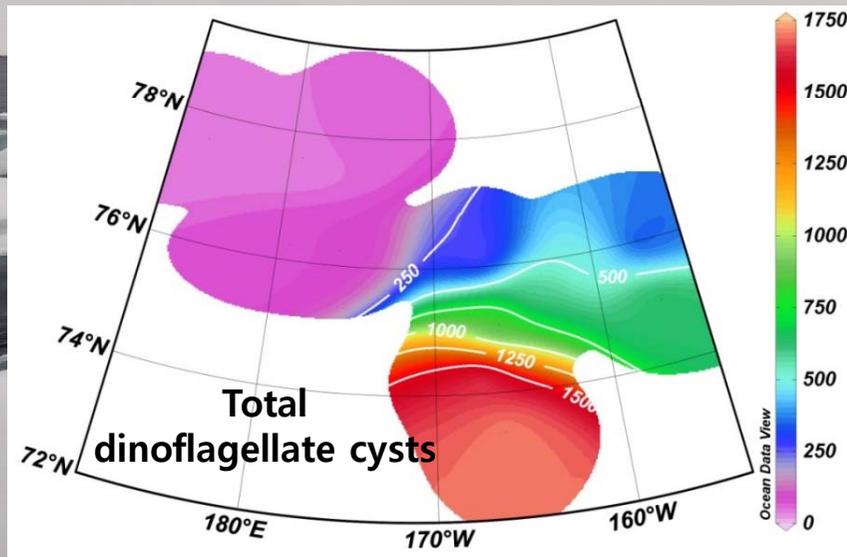
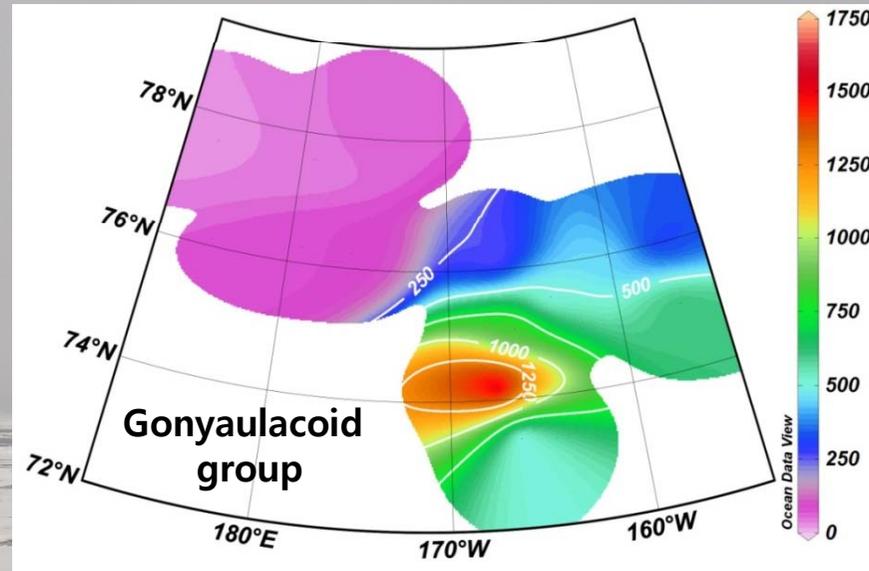
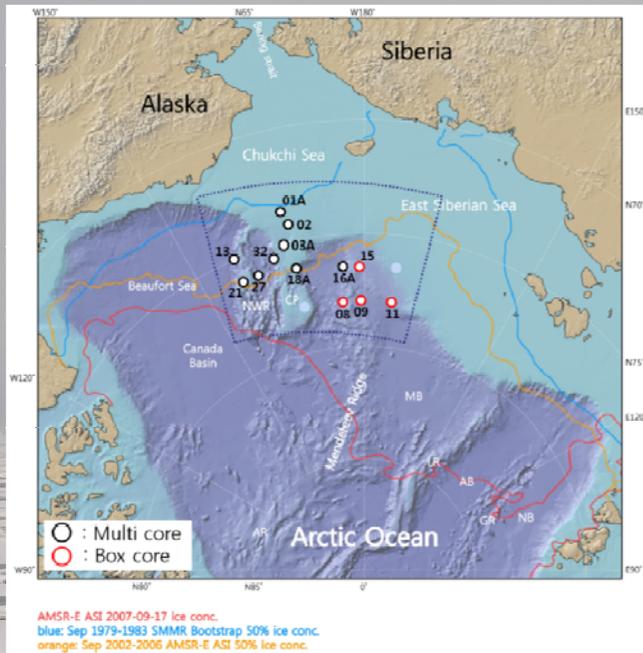
## The Chukchi Sea shelf sediments



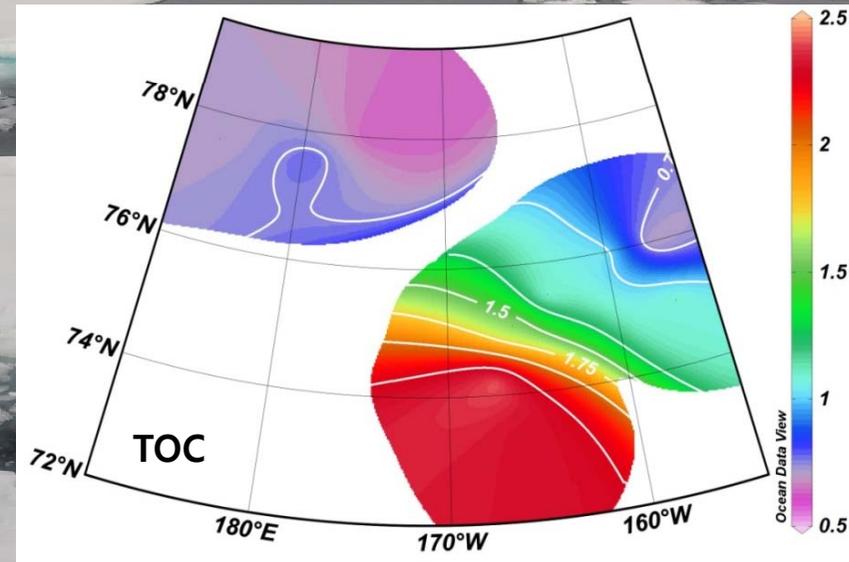
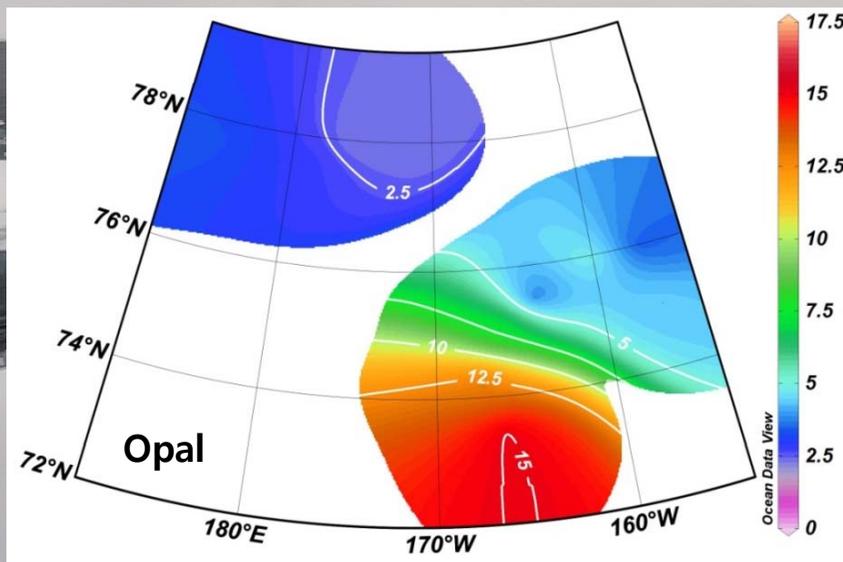
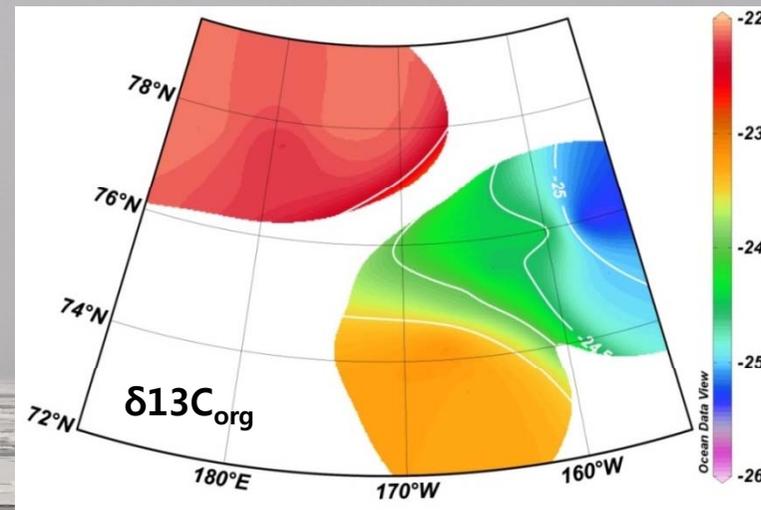
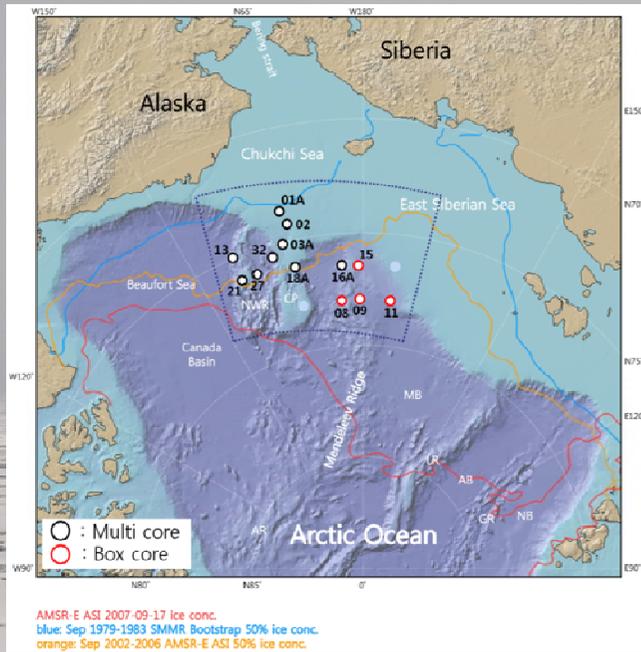
[Dino-Atlas] Atlas of modern organic-walled dinoflagellate cyst distribution  
<http://dino-atlas.pangaea.de/>



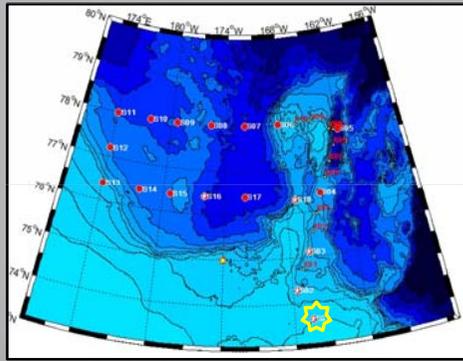
# Preliminary results: surface sediments (ARA01/02B)



# Preliminary results: surface sediments (ARA01/02B)



# Preliminary results: multi core (ARA02B 01A-MUC)

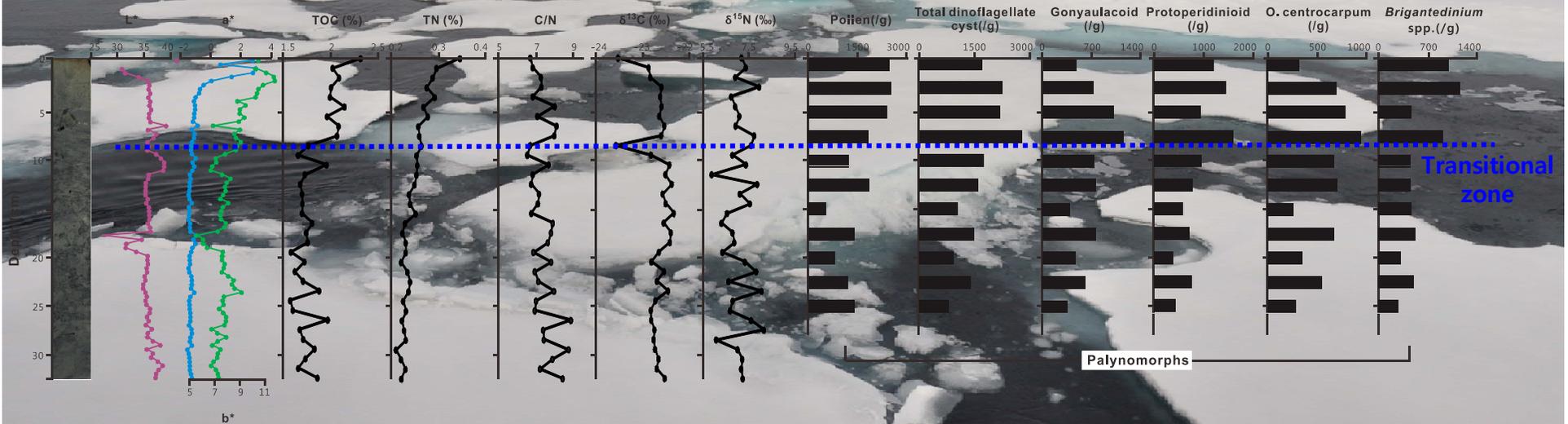
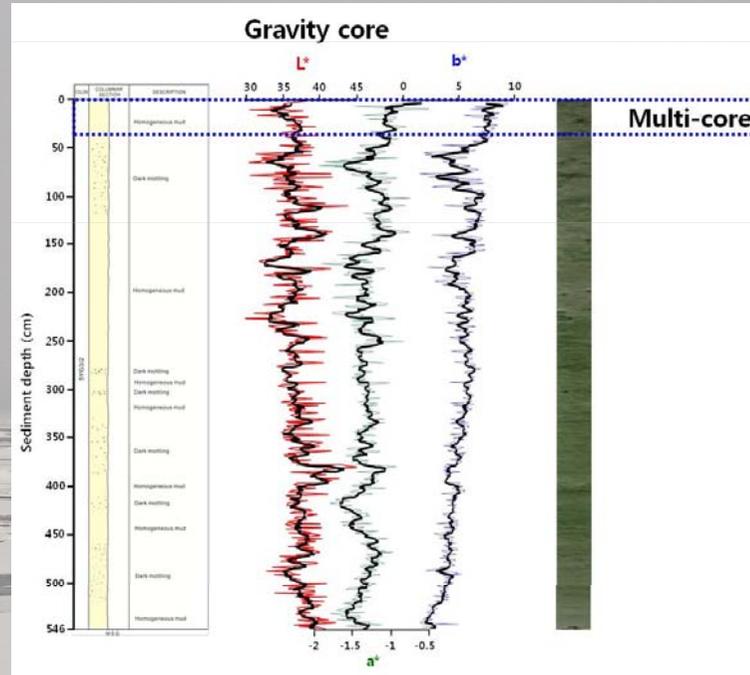


수심: 111m

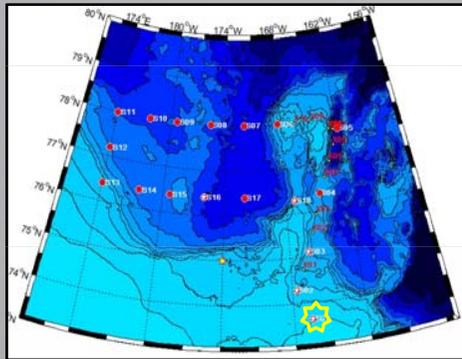
코어시료 길이:

Gravity core: 546cm

Multi-core: 30cm



# Preliminary results: gravity core (ARA02B 01A-GC)

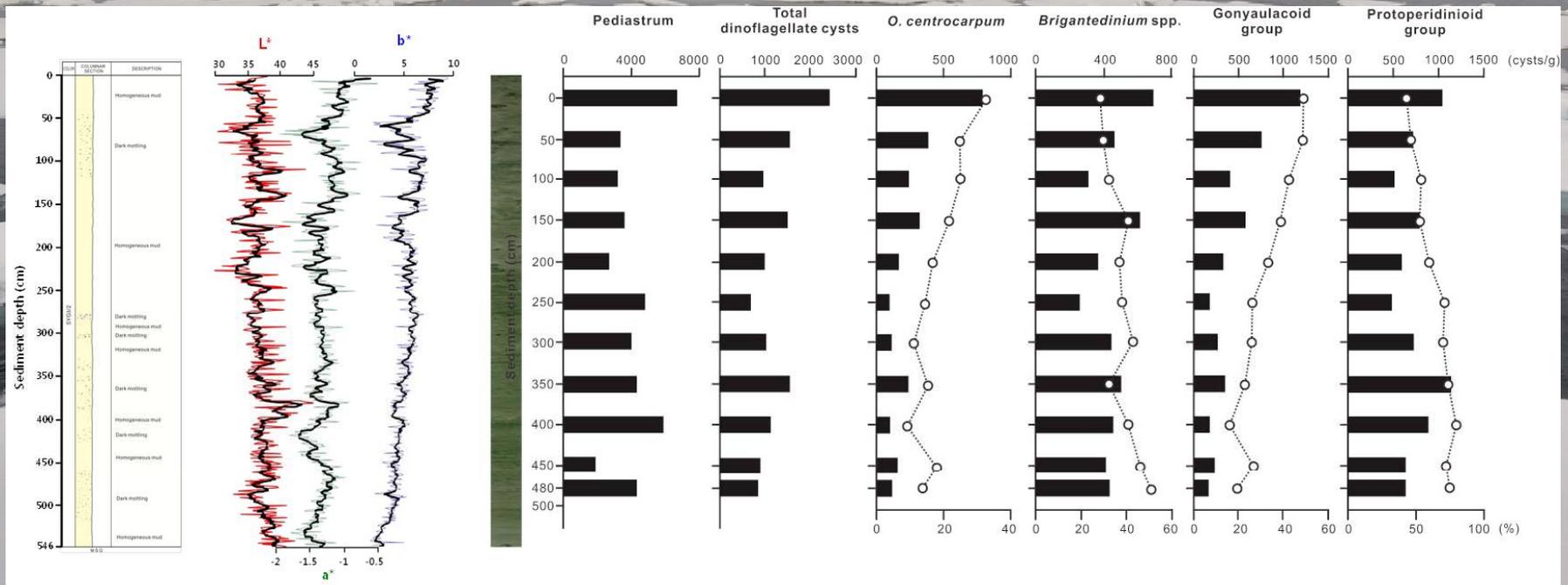


수심: 111m

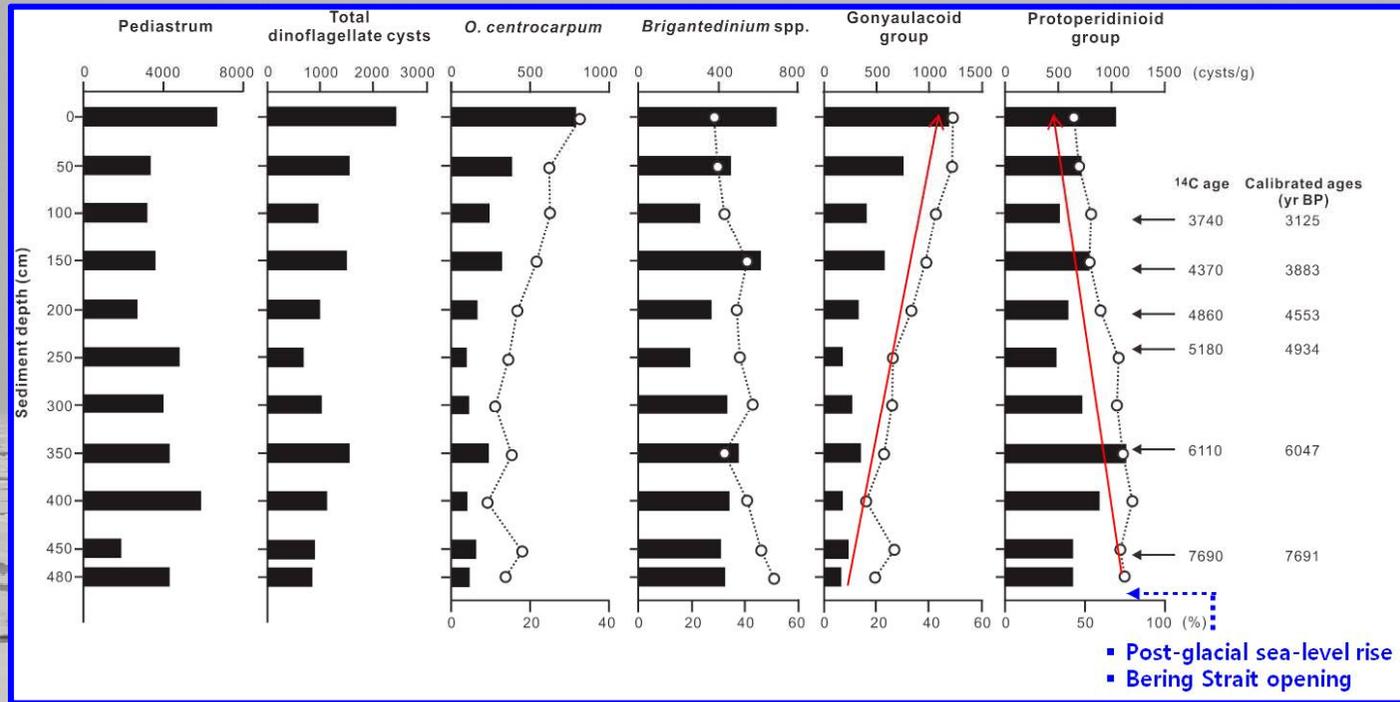
코어시료 길이:

Gravity core: 546cm

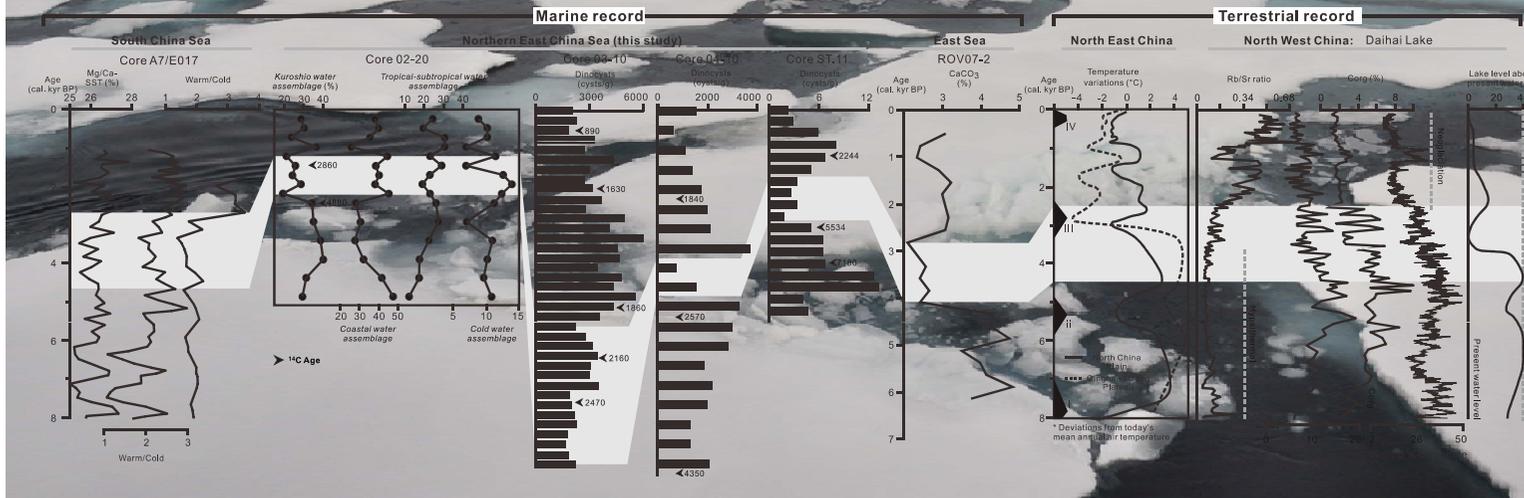
Multi- core: 30cm



# Arctic climate feedback: global implications



## Mid latitude climatic records



ARA02B 01A-GC  
 The western Arctic Ocean?

Thank you for your attention-

