

'11 Arctic Ocean Cruise

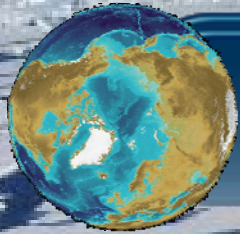


March 28, 2011

Photo courtesy Y.N. Kim



Kyung Ho Chung



Arctic Ocean Cruise 2010



ARA01B Scientific Cruise (July 16-August 14, 2010)



- 7월 1-13일 인천공항-동 (Home) 도착
- 7월 14-16일 남명대연구소원 승선 등
- 7월 17일-8월 12일 북극해 조사 중계
- 8월 13-14일 남명대 (회사) 승선 등
- 8월 14-26일 남명대-북선 도착



Outline

● Purpose:

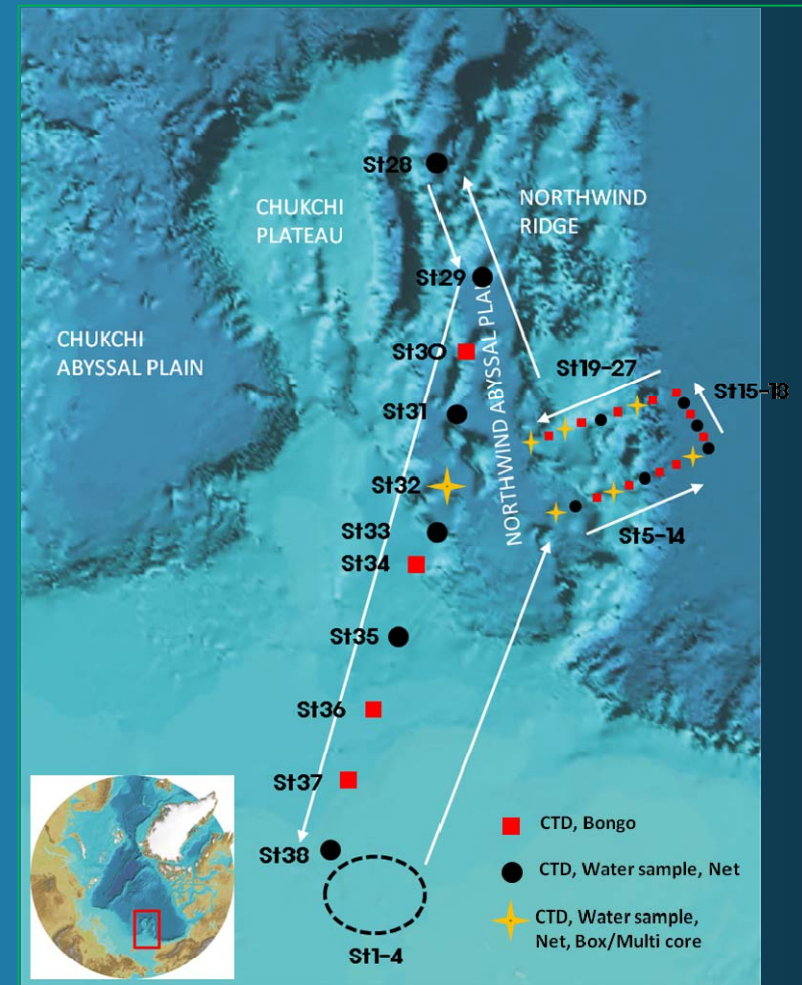
- To monitor marine ecosystem responding to ongoing environmental changes in the western Arctic Ocean

● Period: 2010. 07.17 ~ 08.12 (Nome to Nome)

● Participants: 45

● Research fields:

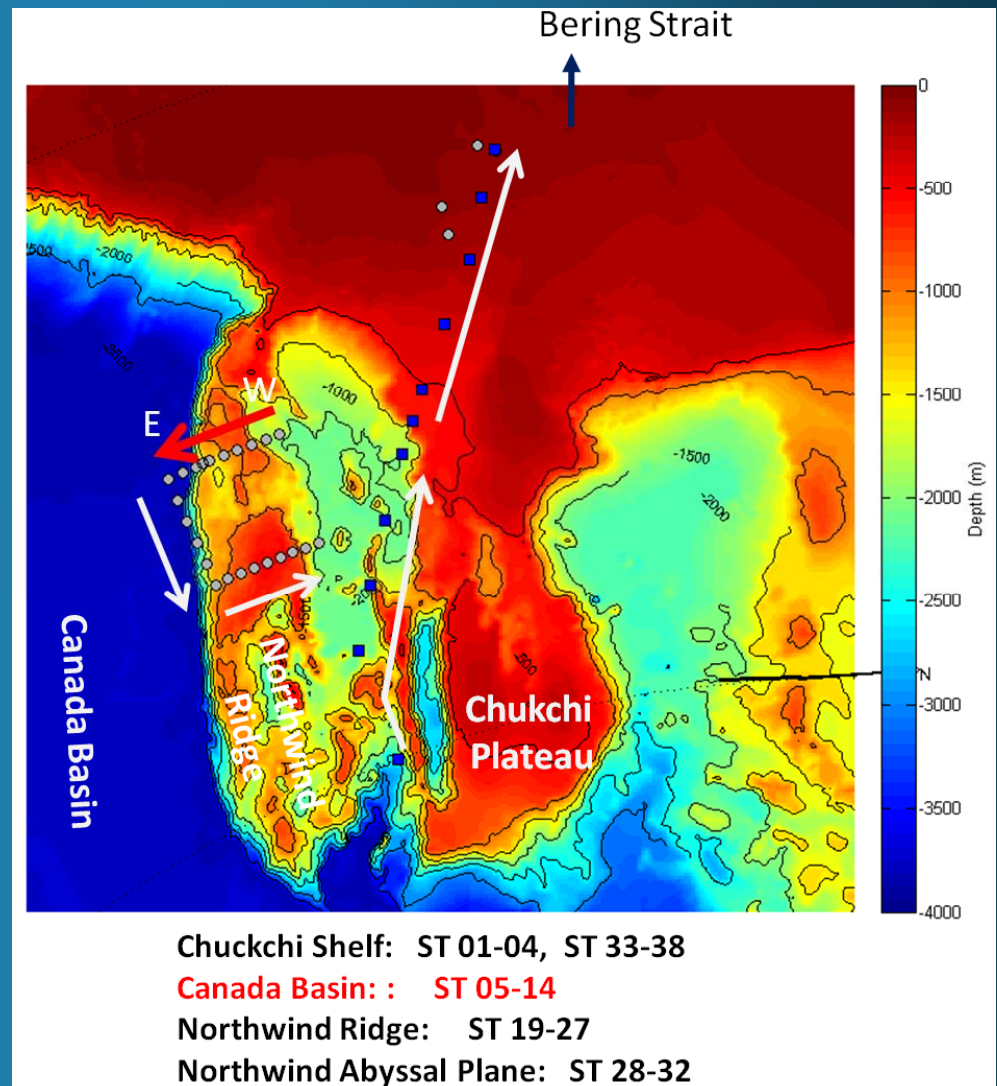
- Hydrography and water mass
- Biogeochemical cycles of bio-gas
- Microbial diversity & community structure
- Diversity and biogeography of diatoms
- Phytoplankton ecology & physiology
- Protozoan community structure and grazing rate
- Trophic role of zooplankton
- Glacial history & paleoceanographic changes

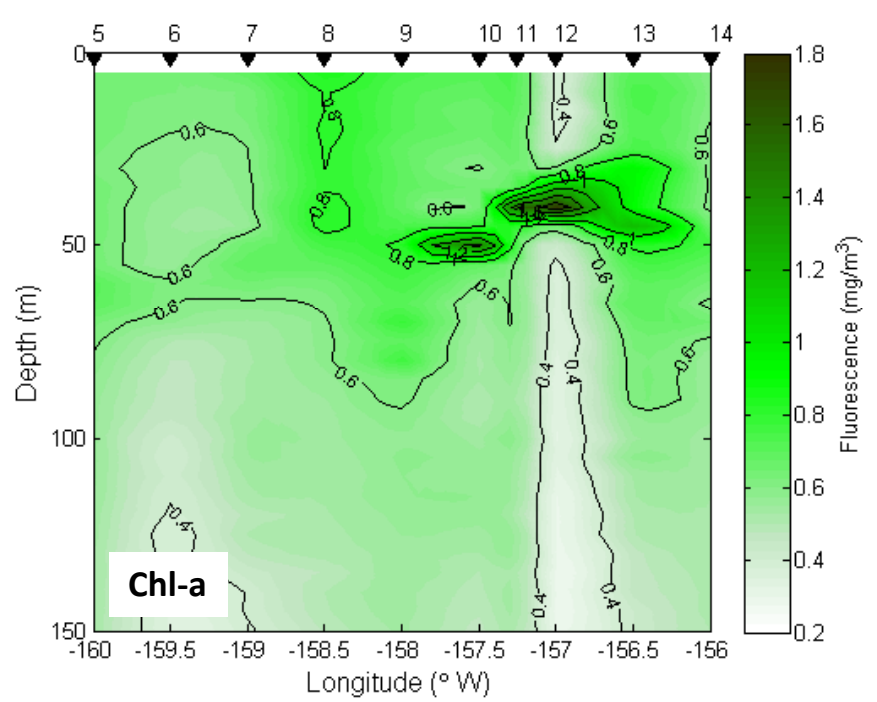
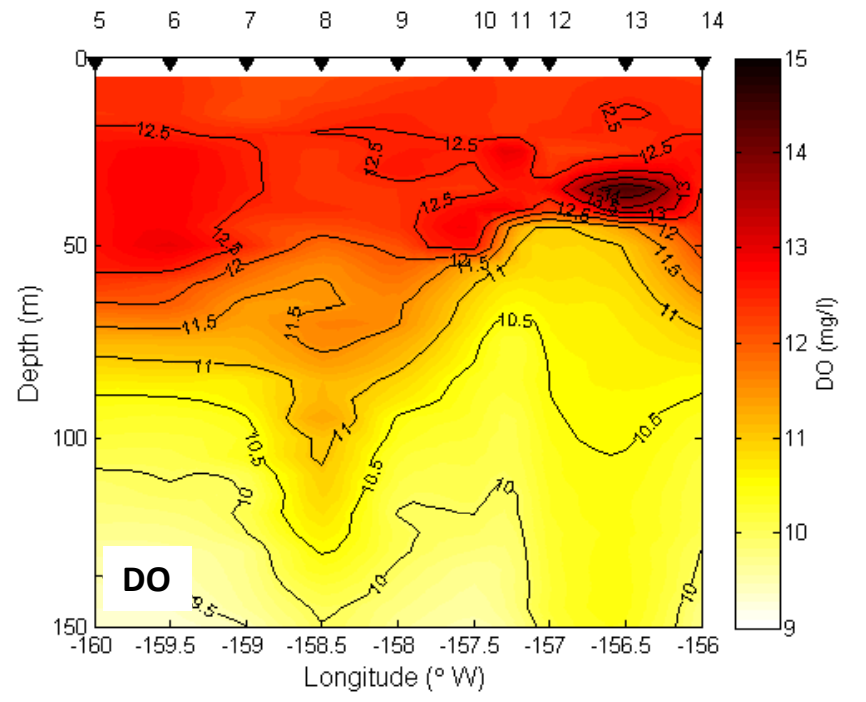
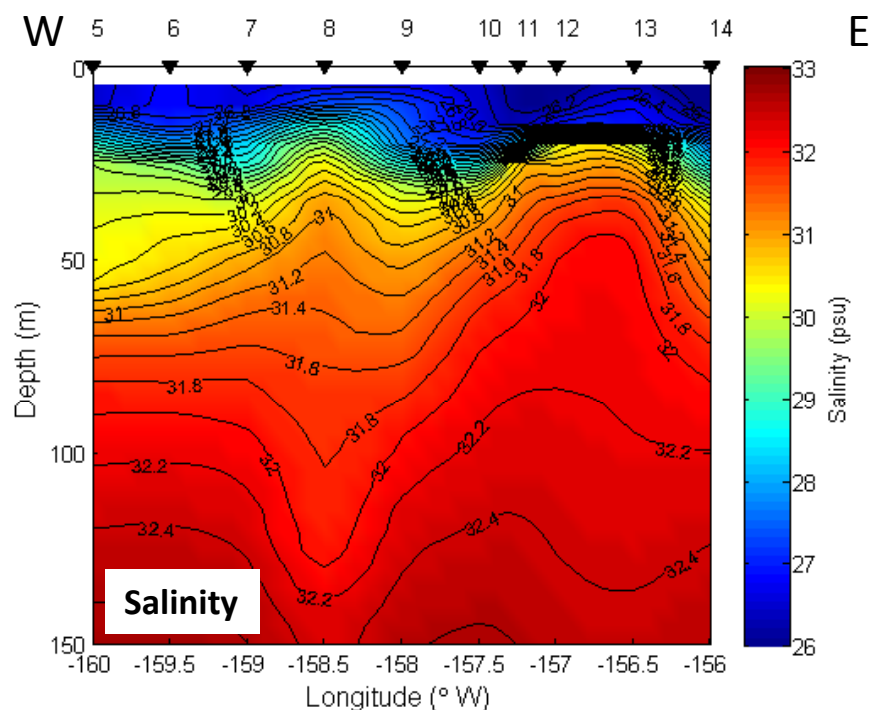
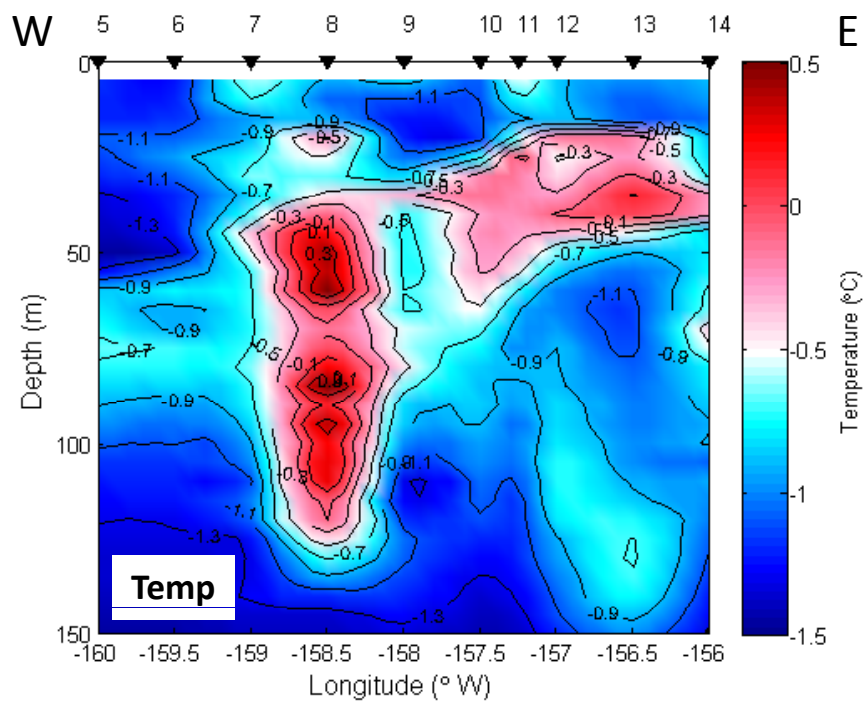


Physical Oceanography

Hydrography and water mass

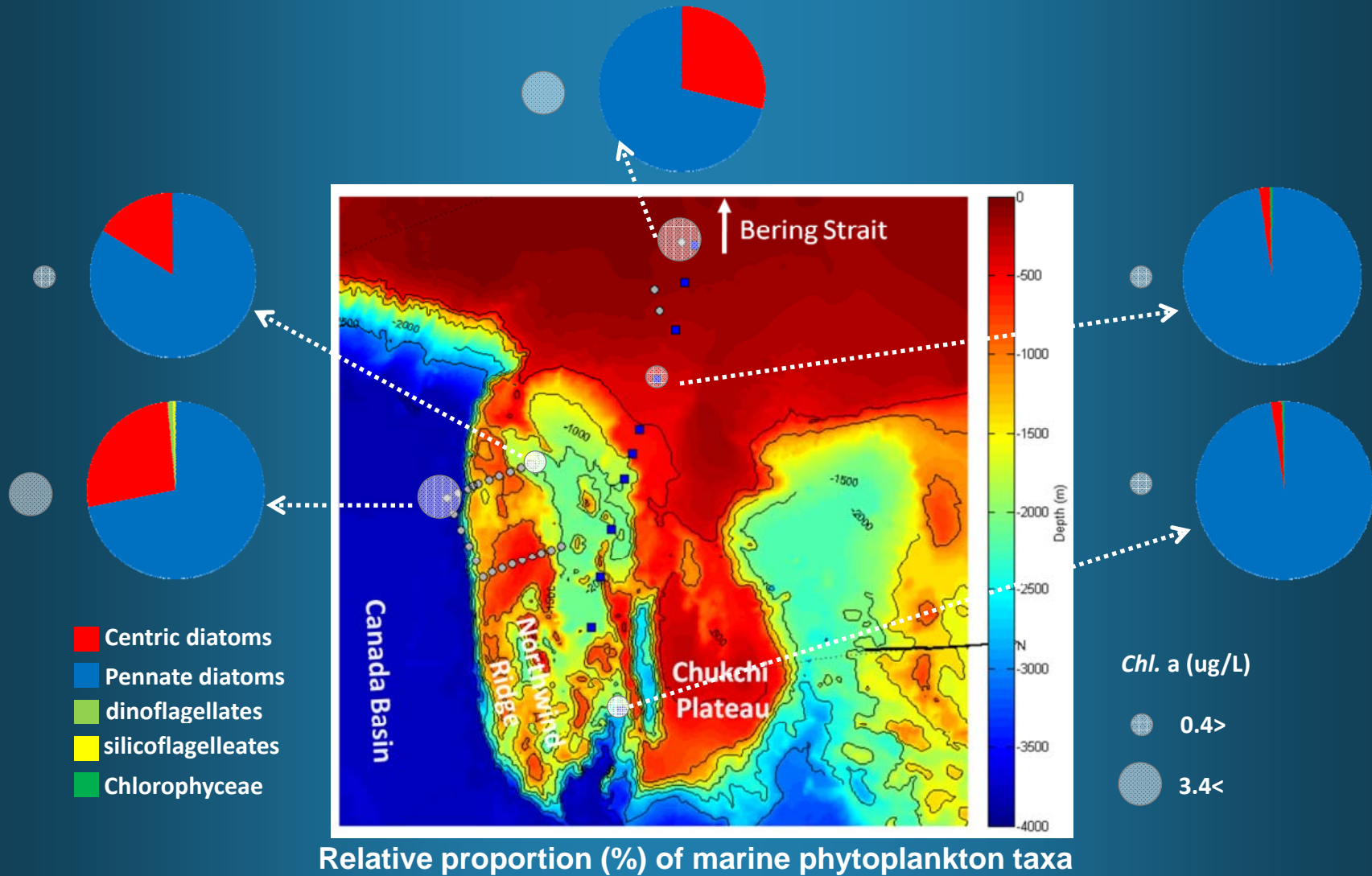
- Objectives:
 - T/S structure
 - Pacific-origin warm water
 - Correlation between water intrusion and sea ice distribution
 - Current velocity field
 - Eddy structure

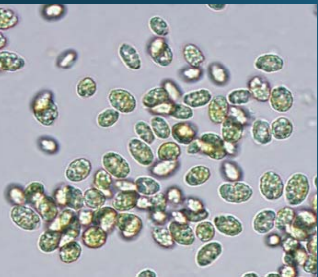




Biological Oceanography

Diversity and species composition of micro-sized phytoplankton





Chaetoceros sp. (<2um)



Nitzschia longissima



10.99 μm



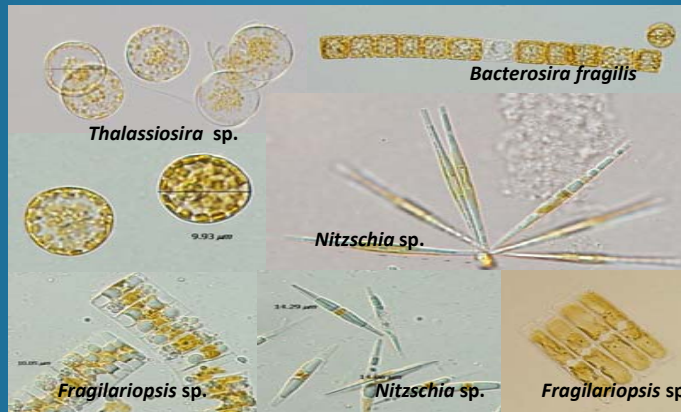
Attheya septentrionalis



Chaetoceros sp.



Nitzschia sp.



Thalassiosira sp.

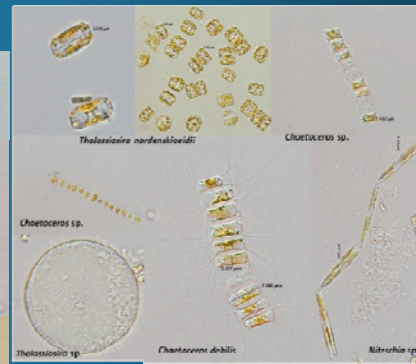
Bacterosira fragilis

Nitzschia sp.

Fragilariopsis sp.

Nitzschia sp.

Fragilariopsis sp.



Thalassiosira nordenskiöldii

Chaetoceros sp.

Chaetoceros sp.

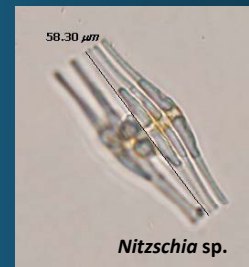
Thalassiosira sp.

Chaetoceros debilis

Nitzschia sp.

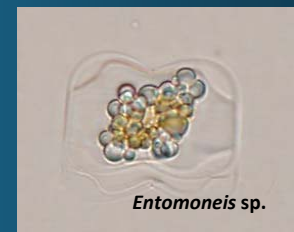


Pennate diatoms



58.30 μm

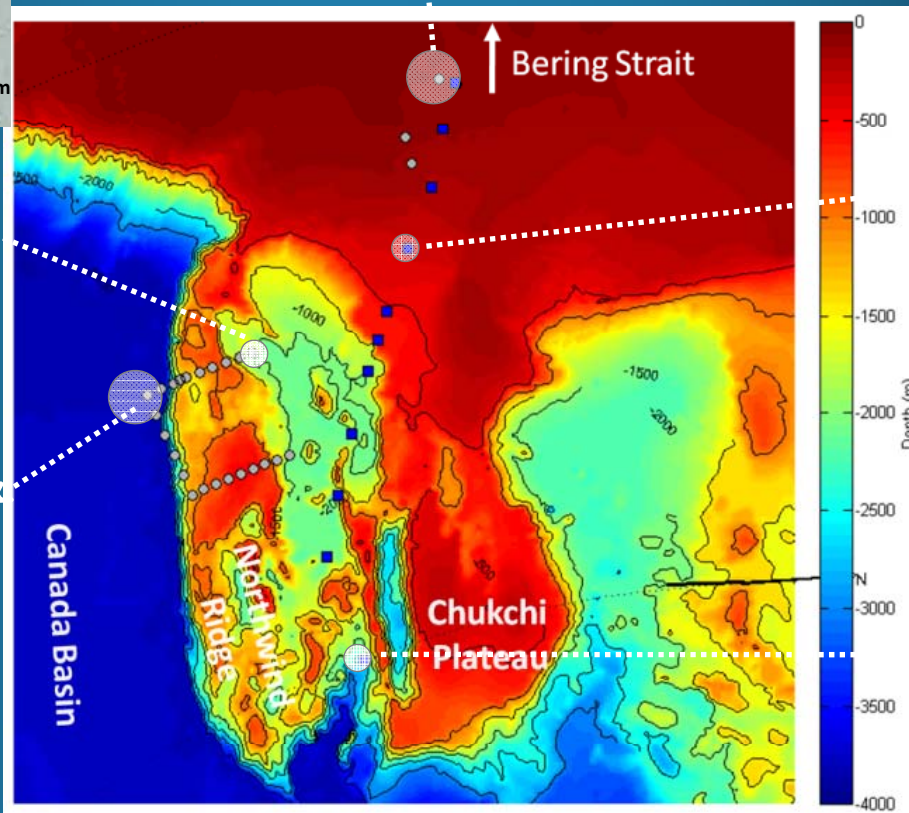
Nitzschia sp.



Entomoneis sp.



Nitzschia sp.

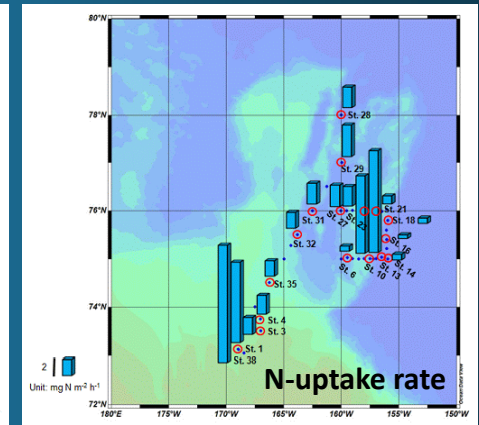
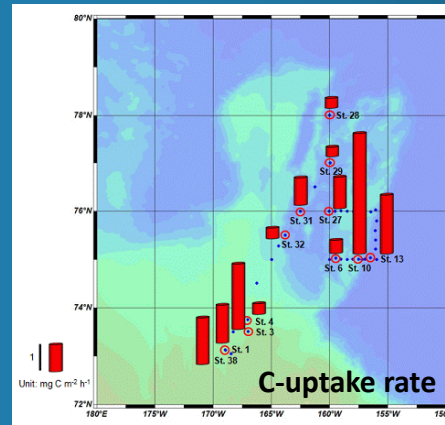
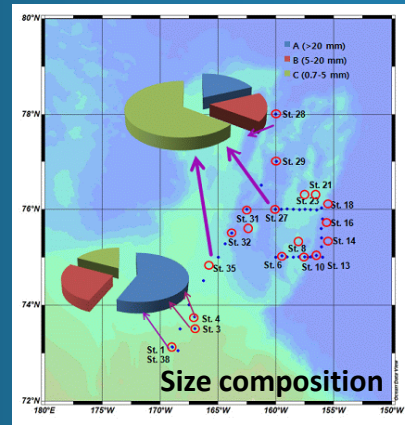
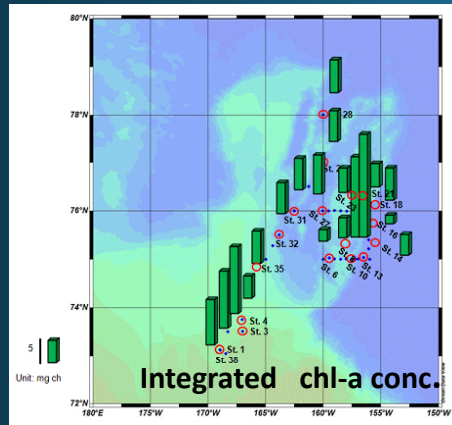
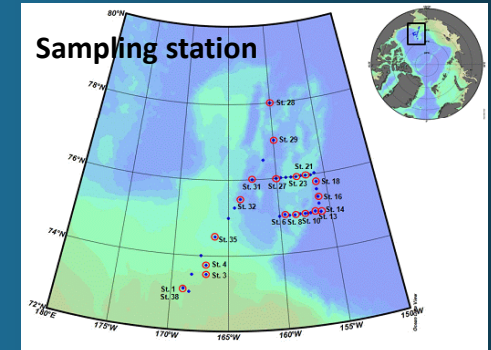


Isolated living specimens from each site

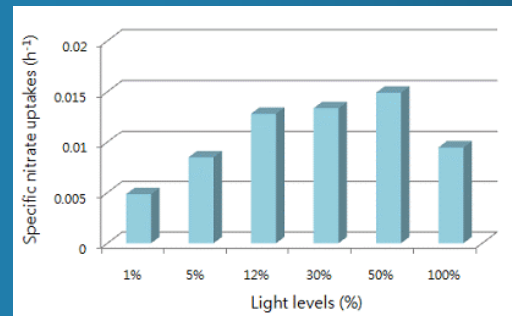
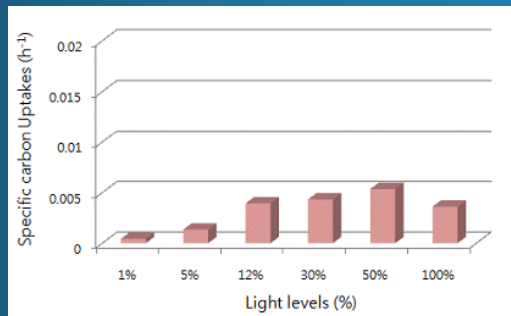
Biological Oceanography

Carbon and Nitrogen uptake rates of phytoplankton

- Objectives:
 - To understand controlling factor for phytoplankton C/N productions
 - To identify the effect of light enrichment on C/N production rates in the chlorophyll-a maximum layer



C-uptakes depending on light levels In the light Enrichment experiment →

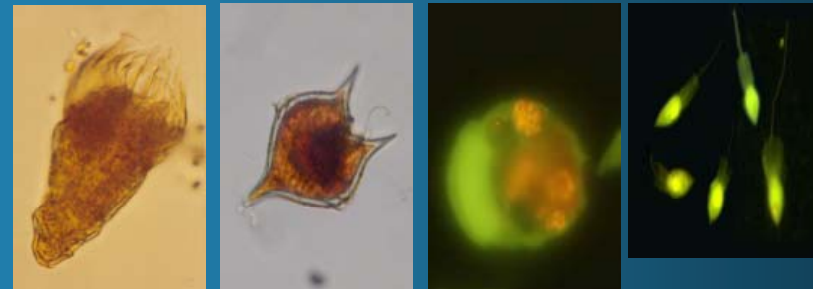
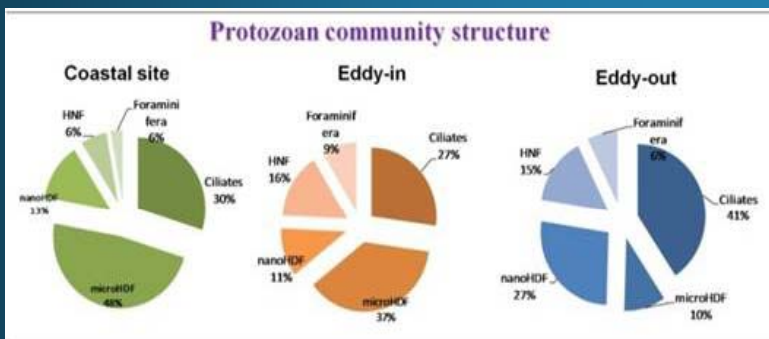
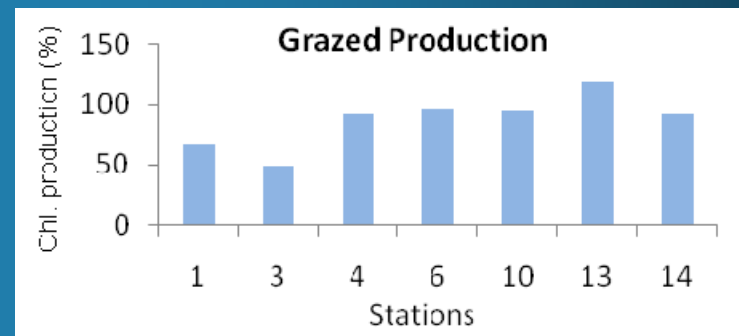
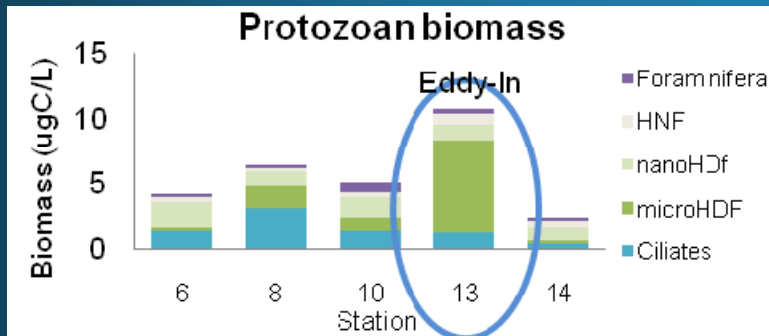


← N-uptakes depending on light levels In the light Enrichment experiment

Biological Oceanography

Protozoan community structure and herbivores

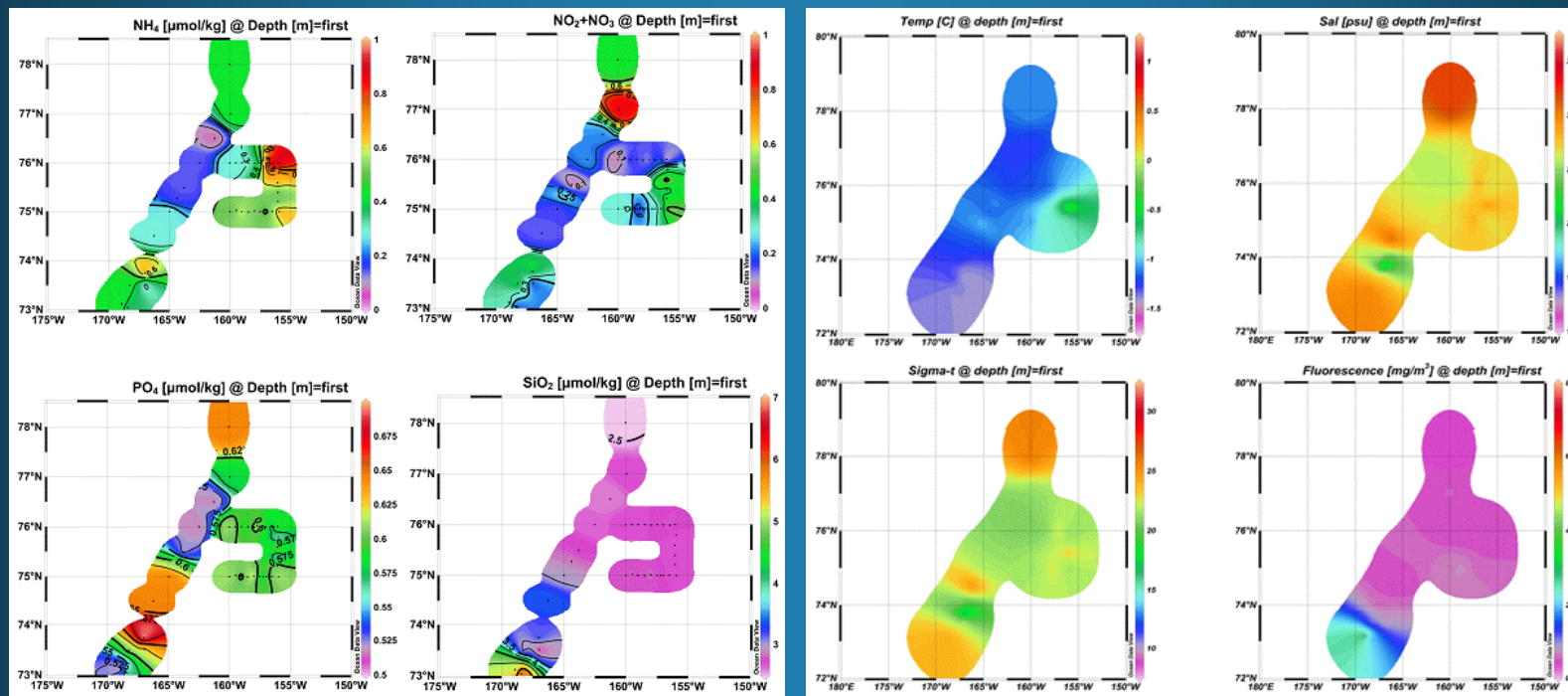
- Objectives:
 - to improve understanding of specific feeding interactions and pathways of carbon flow by protozoa
 - Protozoan abundance, diversity and community structure
 - Comparison of the roles of protozoan and copepod as herbivores



Underway measurement

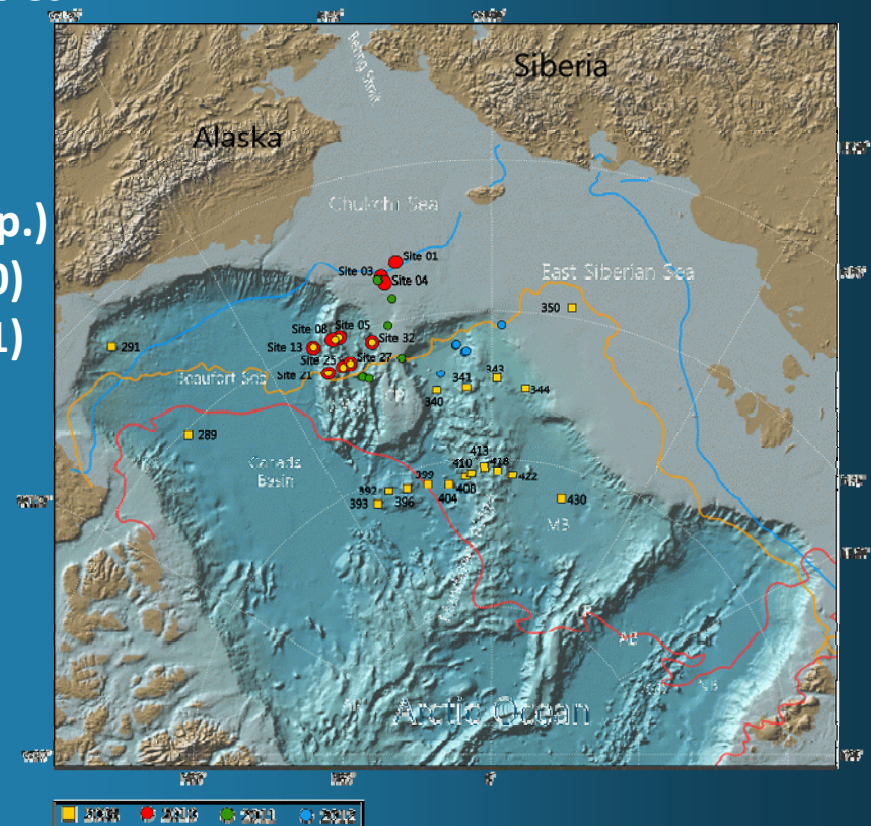
Continuously sampling parameters:

- Temperature & Salinity
- In vivo chlorophyll-a
- Phytoplankton pigments (HPLC samples)
- Nutrients (SiO_2 , NO_3+NO_2 , NH_4 , PO_4)



Paleoceanography

- Objectives:
 - to understand recent oceanographic & environmental changes closely related to global warming in the western Arctic
 - to reconstruct paleoceanographic changes in the western Arctic during the late Quaternary glacial-interglacial cycles
- Materials:
 - 20 surface sediments (0-0.5 cm) from GKG & 5 long sediment cores(2008 Polarstern Exp.)
 - 10 surface sediments (1st ARAON Arctic Exp. 2010)
 - 25 surface sediments (2nd ARAON Arctic Exp. 2011)
- Multi-proxies :
 - $d^{18}O_{\text{forams}}$ & $d^{13}C_{\text{forams}}$, - TOC, $CaCO_3$,
 - Opal contents, - C/N ratio,
 - $d^{15}N_{\text{tot}}$ & $d^{15}N_{\text{org}}$, & $d^{13}C_{\text{org}}$, ^{10}Be , etc.



International collaboration

1. SAMS (UK)

- A case project of combining satellite remote sensing with sea ice mass balance study
 - SAMS ice buoy(3) and CRREL ice buoy deployment
 - EM31-SH calibration and survey

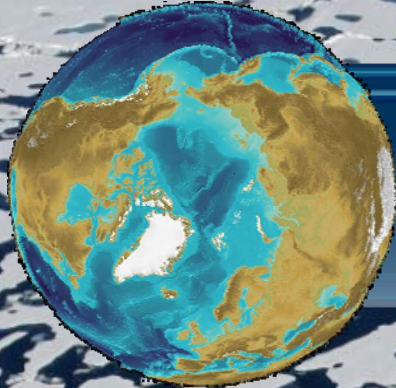
2. NOAA (US)

- SVP2 (60m thermistor) buoy deployment (Mike Steel, Univ. of Washington)

3. PRIC, CAA (China)

- Pollutants in sea water, sea ice and marine sediment
- Bacterial diversity
- Black carbon





2011 Planed Works (tentative)



Study Area (tentative)

