

Abstract

Recent studies have shown that photosynthetic eukaryotes are an active and often dominant component of Arctic phytoplankton assemblages. In order to investigate the structure of phytoplankton communities, this study was carried out at 18 stations from July 29 to August 20, 2011 in the Chukchi Sea and Canadian Basin. Concentrations of total microphytoplankton, and nano-picophytoplankton chlorophyll *a* were higher at southwest area than northern area in the study area due to Bering shelf Anadyr Water current from Bering Strait. On the Melting ponds in Canadian Basin, phytoplankton communities were composed of 31 taxa representing Bacillariophyceae, Chrysophyceae, Dictyochophyceae, Prasinophyceae and unidentified phytoplankton (< 20 μ m). The most abundant species were *Pyramimonas* sp. and *Thalassiosira* sp. except nano-pico sized phytoplankton in Melting pond.

Materials and Methods

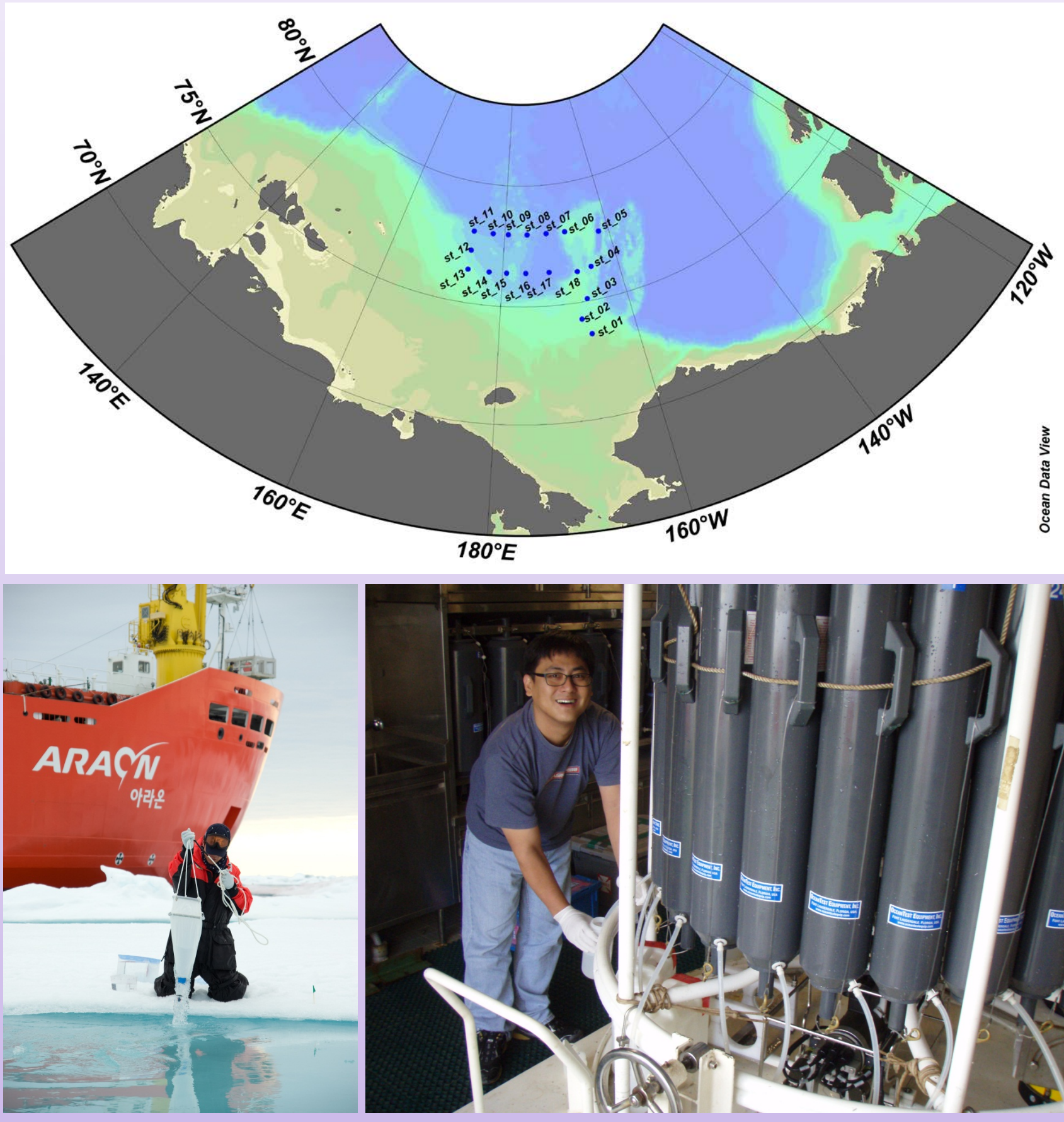


Fig. 1. Sampling locations in the study area

- **Sampling period**
 - 29th July – 20th August (summer season), 2011
- **Contents of the study**
 - Study on summer biodiversity of phytoplankton communities in Chukchi Sea and Sea ice
 - Biological baseline survey for long-term environmental monitoring

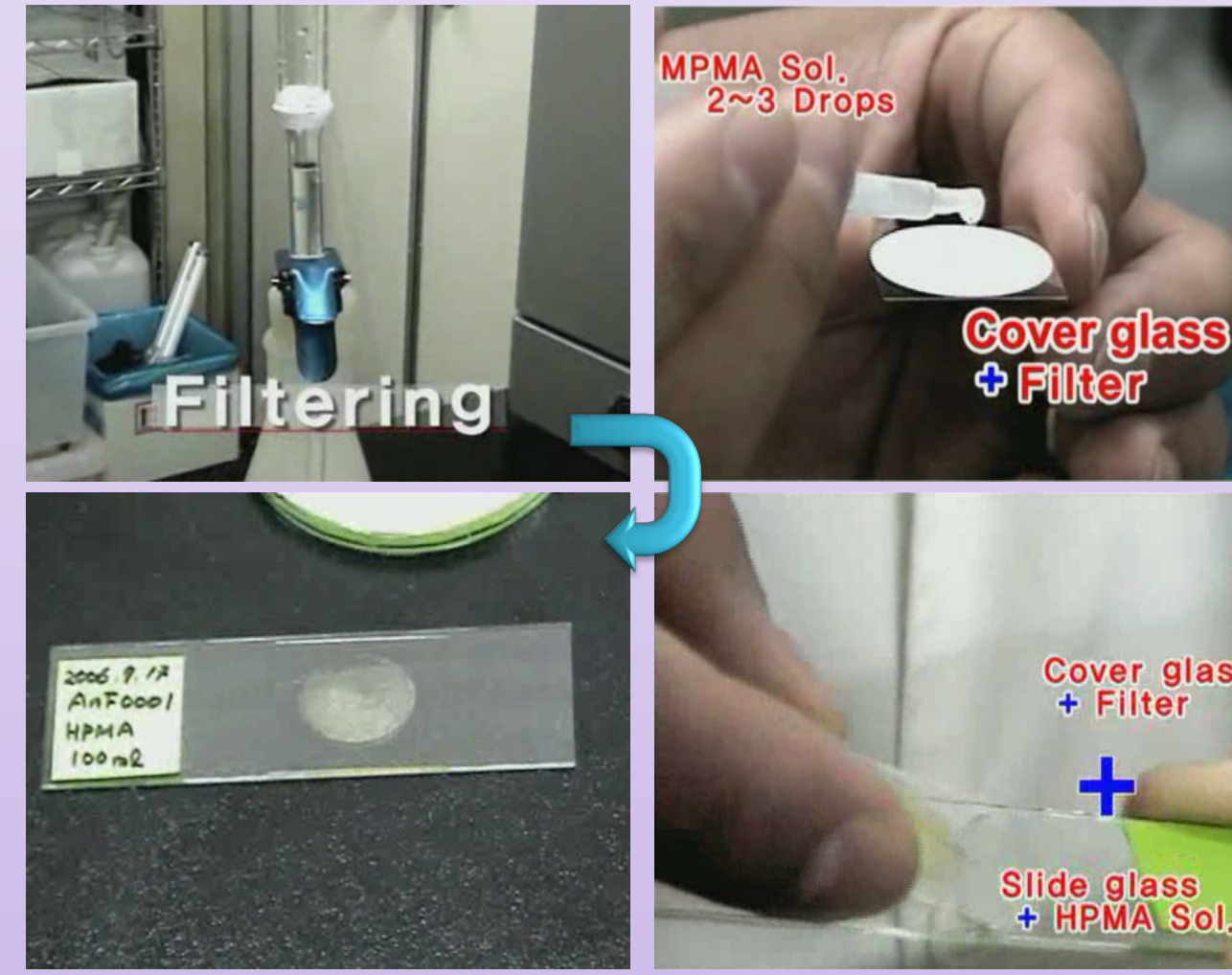


Fig. 2. HPMa Slide Method for phytoplankton quality and quantity analysis.



Fig. 3. Pathways of currents and oceanographic features of the northern Bering Sea and western Arctic Ocean (from Nelson *et al.* 2009)

Research purposes

- To investigate on species composition, abundance and dominant species of phytoplankton communities in the Chukchi Sea and Sea Ice
- To study on taxonomic research and dominant species of phytoplankton communities for investigate on indicator species

Results

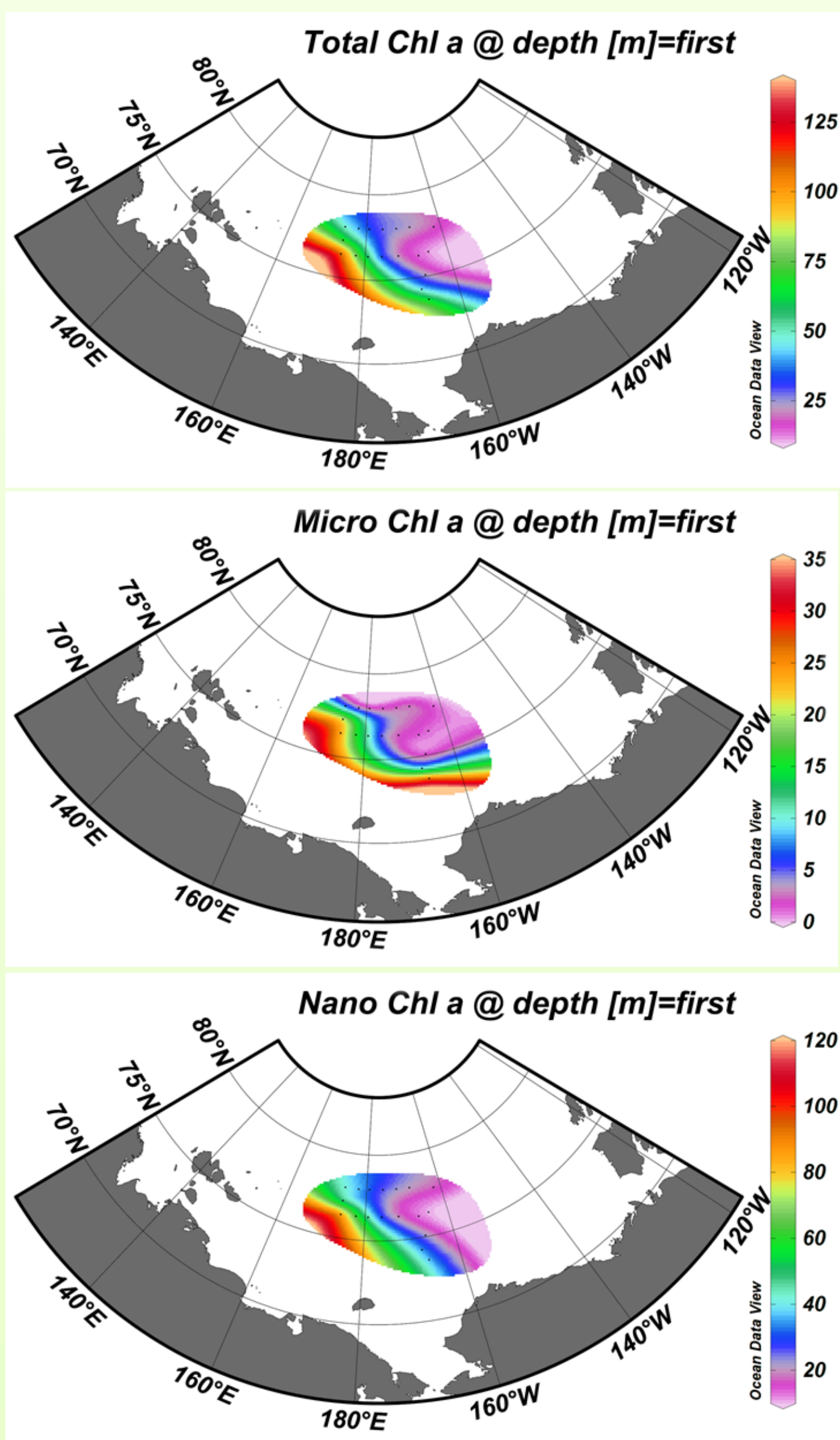


Fig. 4. Contour of chlorophyll *a* concentration on surface in the study area.

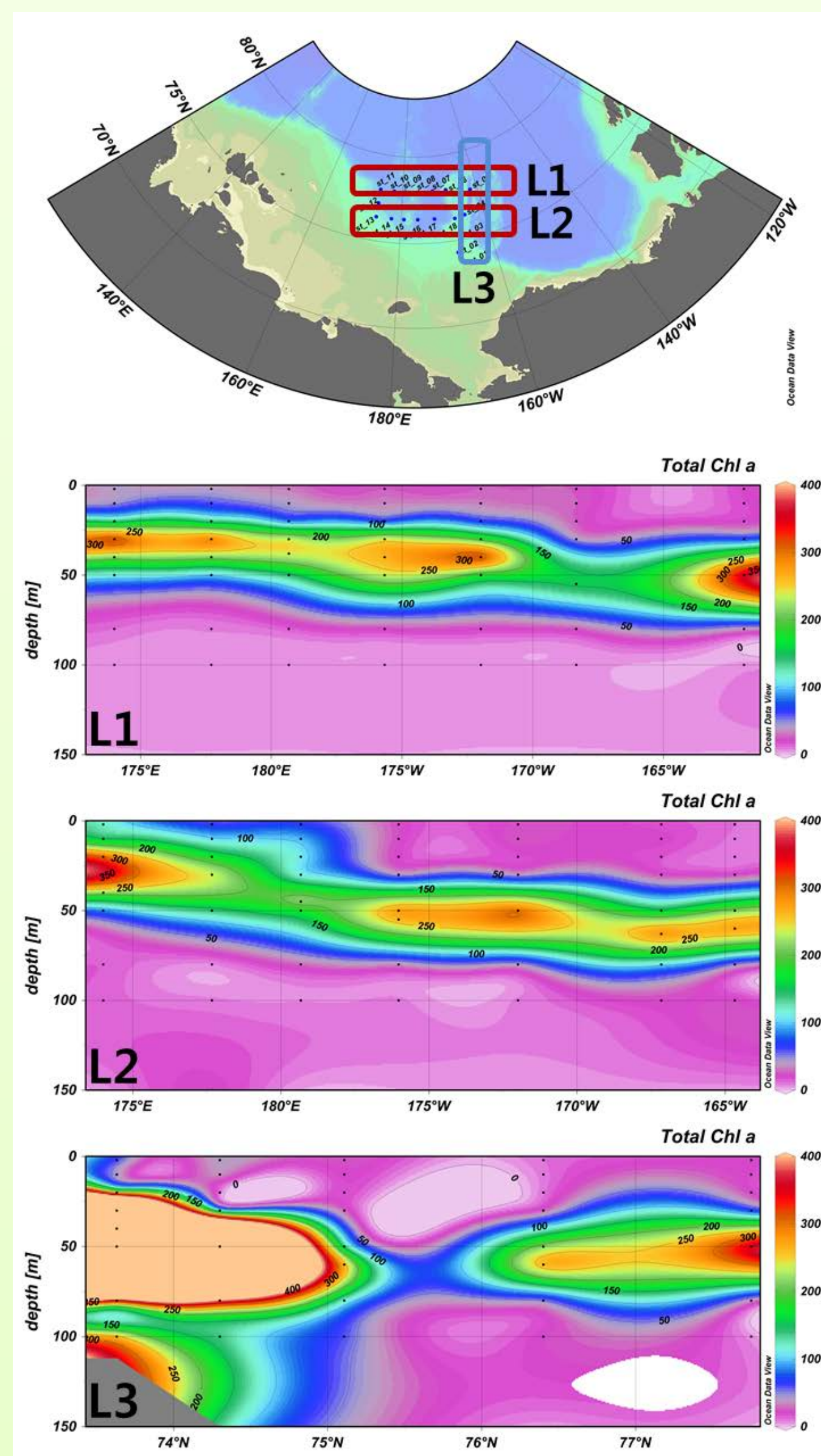


Fig. 5. Cross section map of chlorophyll *a* concentration.

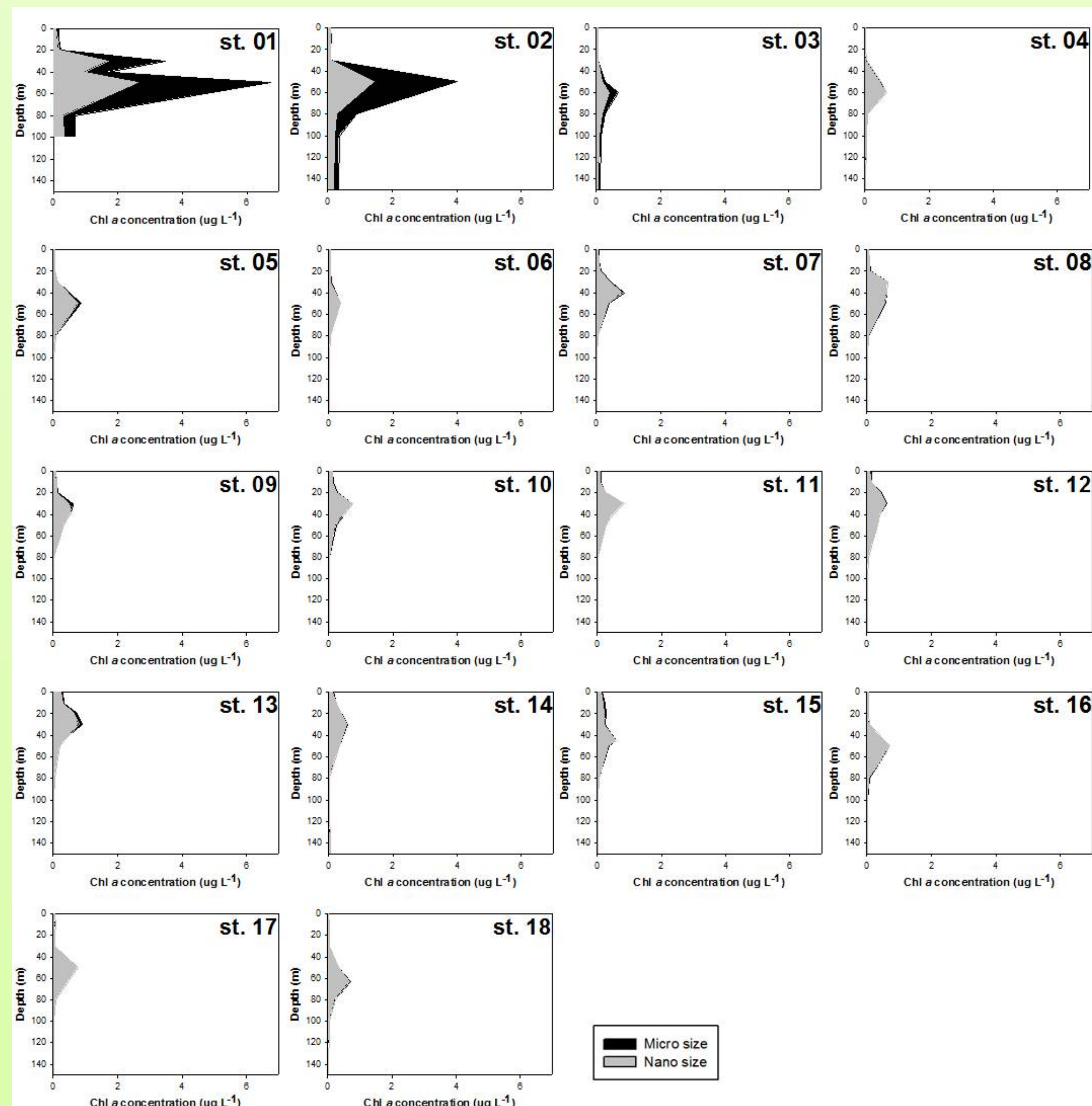


Fig. 6. Vertical distribution of micro- and nano chlorophyll *a* concentration at each station.

Table 1. Environmental factors of Sea Ice station in the study area

| Station | number | Depth(m) | width*length(m ²) | Temp. (°C) | Sal. (psu) |
|----------|--------|----------|-------------------------------|------------|------------|
| Ice St.1 | mp1 | 0.4~0.5 | 10*12 | 0.3 | 0.5 |
| | mp2 | 0.4~0.5 | 12*12 | 0.9 | 25.3 |
| | mp3 | 0.4~0.5 | 8*8 | 0.9 | 23.8 |
| | mp4 | 0.4~0.5 | 3*3 | -1.1 | 13.5 |
| | mp5 | 0.4~0.5 | 1.5*1.5 | -0.9 | 17.4 |
| Ice St.2 | mp1 | 0.4~0.5 | 8*2 | 0.8 | 0 |
| | mp2 | 0.4~0.5 | 10*8 | -1.1 | 28.3 |
| | mp3 | 0.4~0.5 | 5*4 | 0.6 | 0.6 |
| | mp4 | 0.4~0.5 | 20*10 | -1.3 | 22.4 |

Table 2. The appearance species of phytoplankton in Melting pond

| Bacillariophyceae | size (um) | Bacillariophyceae | size (um) |
|-------------------------------|-----------|------------------------------------|-----------|
| <i>Cylindrotheca</i> sp.1 | 80-100 | unidentified pennate diatom 1 | 5-10 |
| <i>Cylindrotheca</i> sp.2 | 130-150 | unidentified pennate diatom 2 | 10-20 |
| <i>Fragilariopsis</i> sp. 1 | 10-20 | unidentified pennate diatom 3 | 40-60 |
| <i>Fragilariopsis</i> sp. 2 | 50-60 | unidentified pennate diatom 4 | 50-70 |
| <i>Fragilariopsis</i> sp. 3 | 70-80 | unidentified pennate diatom 5 | 80-100 |
| <i>Navicula</i> sp.1 | 10-20 | unidentified centric diatom | 20-30 |
| <i>Navicula</i> sp.2 | 30-40 | | |
| <i>Navicula</i> sp.3 | 40-50 | Chrysophyceae | |
| <i>Navicula</i> sp.4 | 50-60 | <i>Dinobryon belgica</i> | 10-20 |
| <i>Navicula</i> sp.5 | 70-80 | | |
| <i>Nitzschia</i> sp. | 70-80 | Dictyochophyceae | |
| <i>Thalassionema</i> sp.1 | 30-40 | <i>Dictyocha speculum</i> | 20-30 |
| <i>Thalassionema</i> sp.2 | 50-60 | <i>Meringosphaera mediterranea</i> | 10-20 |
| <i>Thalassionema oceanica</i> | 50-70 | | |
| <i>Thalassiosira</i> sp.1 | <10 | Prasinophyceae | |
| <i>Thalassiosira</i> sp.2 | 10-20 | <i>Pyramimonas</i> sp. | 5-10 |
| <i>Thalassiosira</i> sp.3 | 20-30 | | |
| <i>Thalassiosira</i> sp.4 | 30-50 | unidentified sp. | <2, 10-20 |

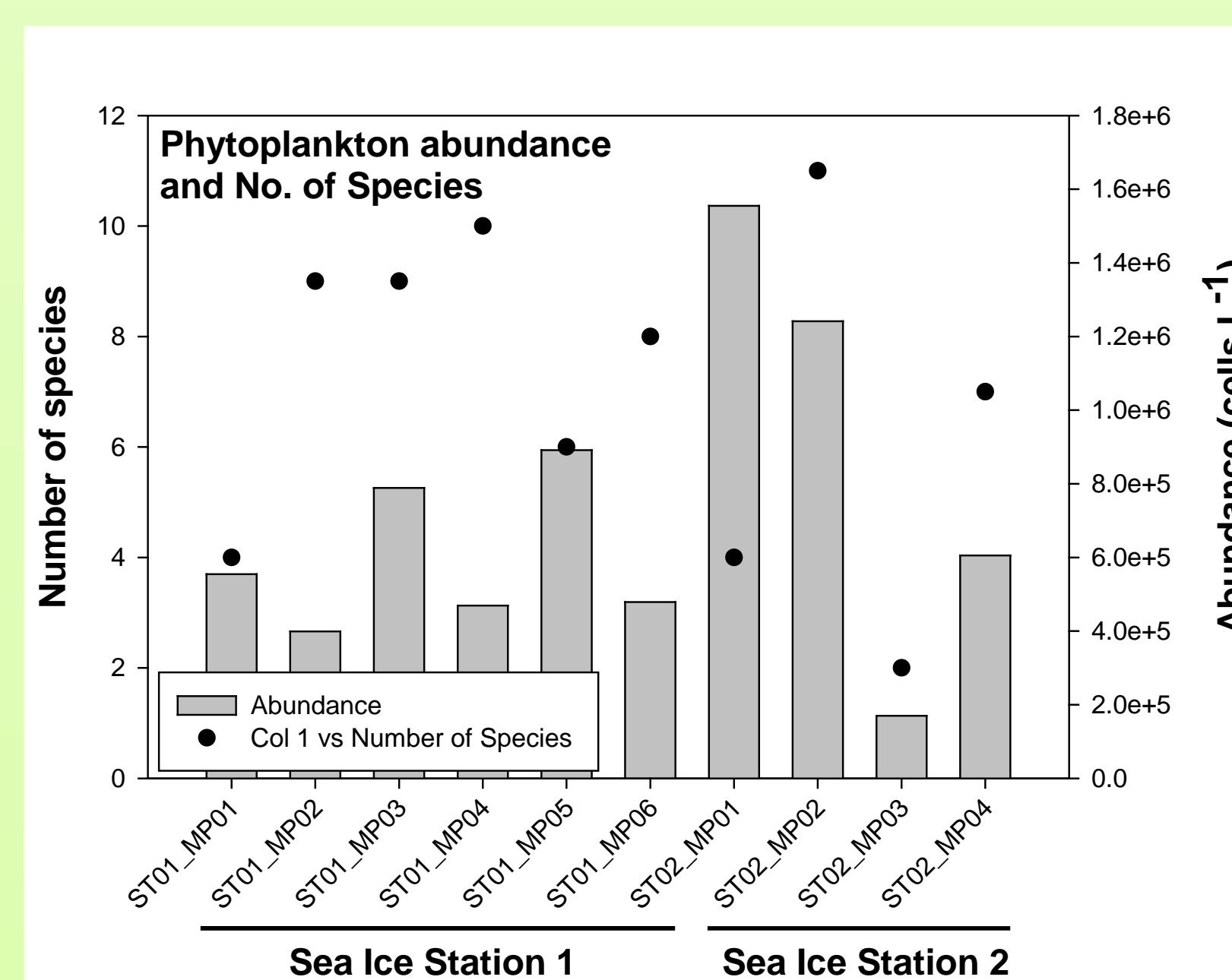


Fig. 7. Variation of phytoplankton cell abundance and number of species in Melting pond.

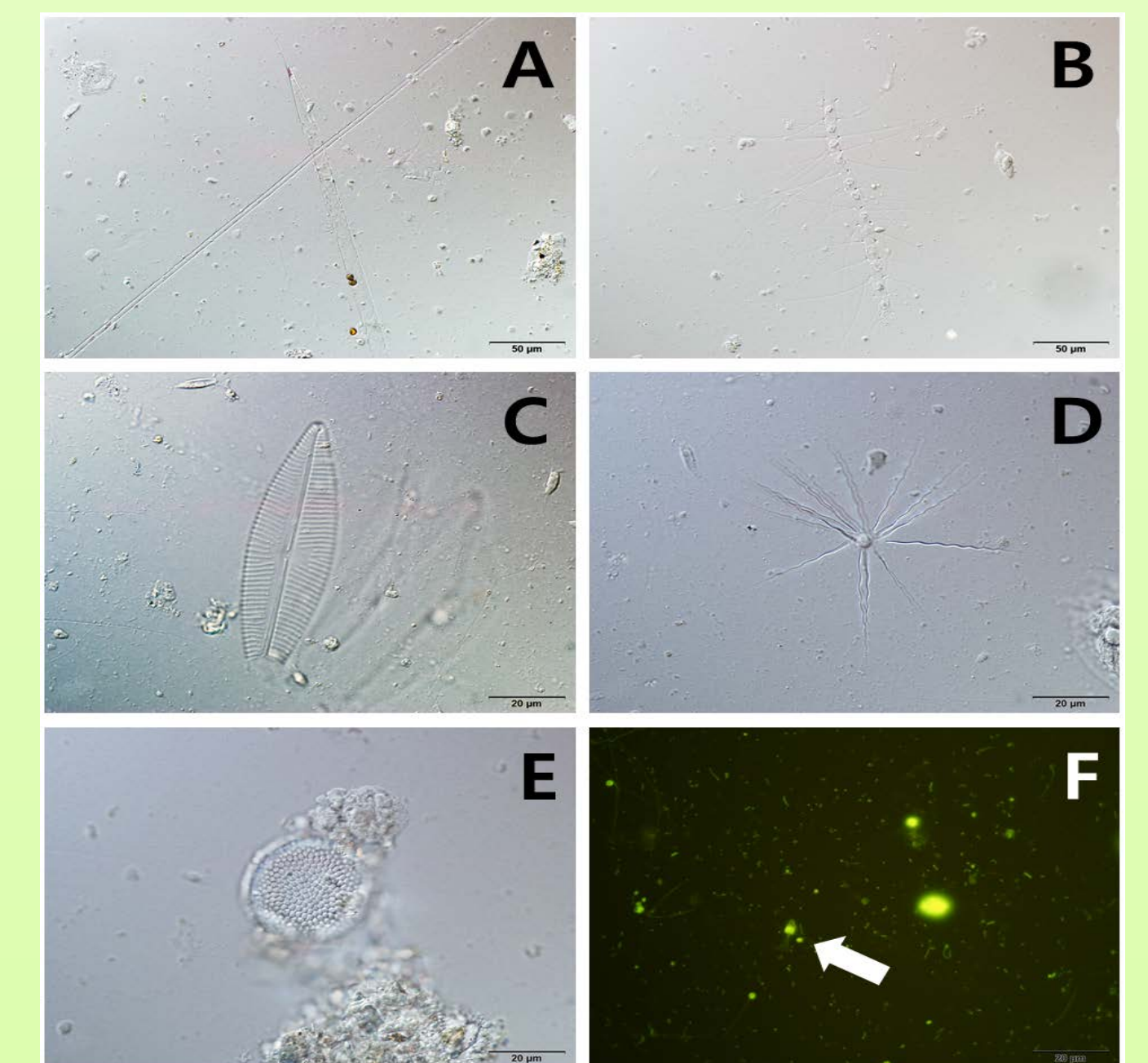


Fig. 8. Plates of major phytoplankton in the study area. (A: *Rhizosolenia hebetata*, B: *Chaetoceros compressus*, C: *Navicula distans*, D: *Meringosphaera mediterranea*, E: *Thalassiosira* sp., F: *Pyramimonas* sp. and pico-nano sized phytoplankton)

Conclusion

- ✓ Concentrations of total microphytoplankton, and nano-picophytoplankton chlorophyll *a* were higher at southwest area than northern area in the study area due to Bering shelf Anadyr Water current from Bering strait.
- ✓ In the Melting ponds, phytoplankton communities were composed of 31 taxa representing Bacillariophyceae, Chrysophyceae, Dictyochophyceae, Prasinophyceae and unidentified phytoplankton (<20 μ m)
- ✓ The most abundant species were *Pyramimonas* sp. and *Thalassiosira* sp. except nano-pico sized phytoplankton in Melting pond.