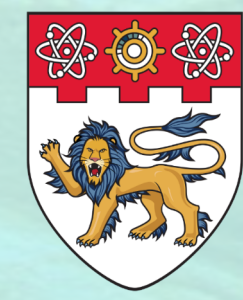


Temporal dynamics of the under-ice Arctic phytoplankton spring bloom



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1. Introduction

- The Arctic phytoplankton spring bloom (comprising pelagic, bottom-ice and under-ice blooms) provides large annual pulses of primary production to the Arctic ecosystem.
- Magnitude of ice and under-ice blooms have been underestimated ~10X (undetectable by satellite)
- Effects of climate change (e.g. earlier onset of the spring bloom, retreating ice cover) alters the phenology of the algae communities

Research Questions

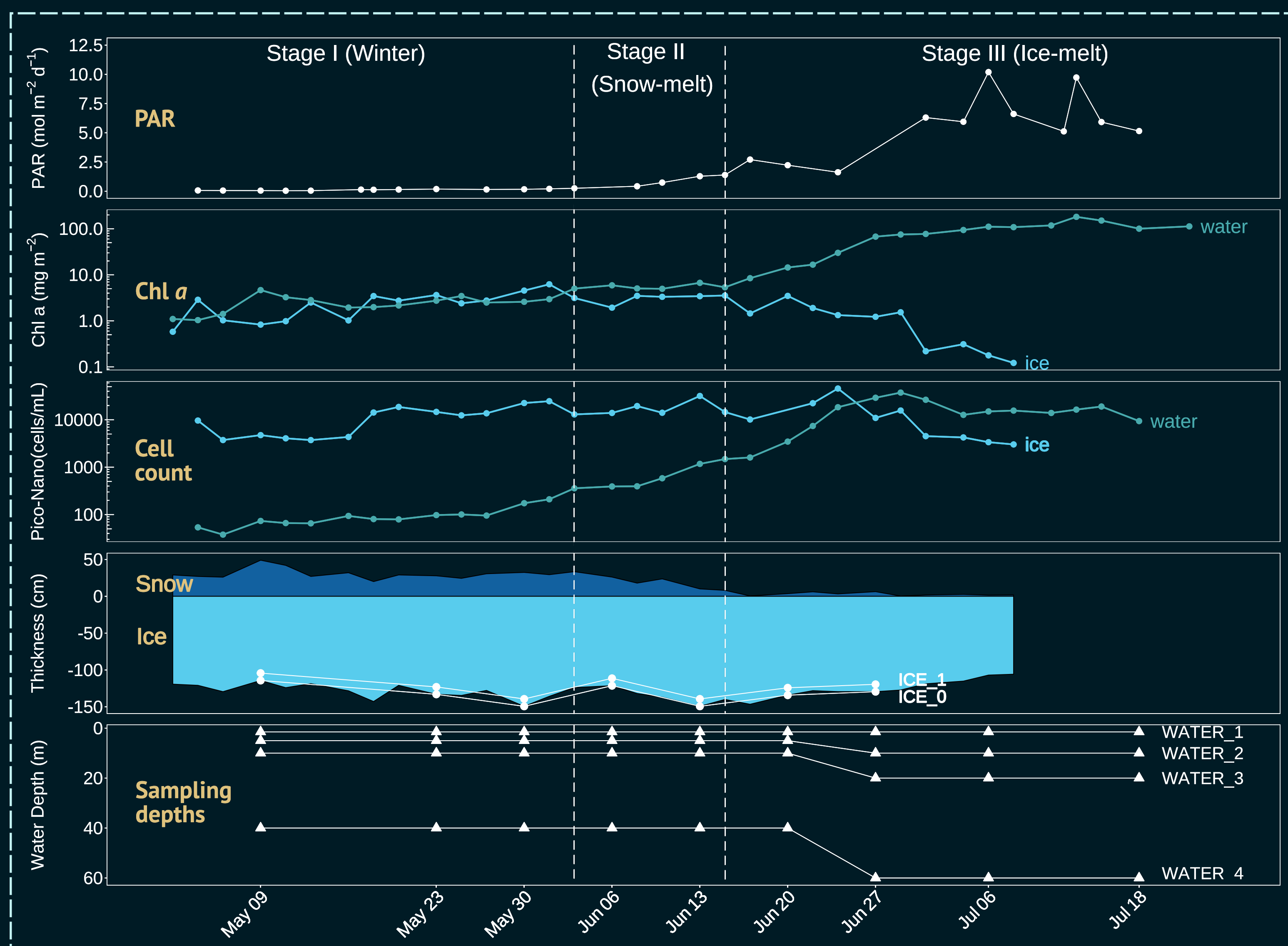
- How do the ice algae and phytoplankton communities evolve throughout the bloom?
- What are the biogeographical distributions of key taxa?

Study Site

- Green Edge Ice Camp campaign
- 20 April - 27 July 2016
- Landfast sea ice southeast of Qikiqtarjuaq Island (67.5 N, 63.8 W)



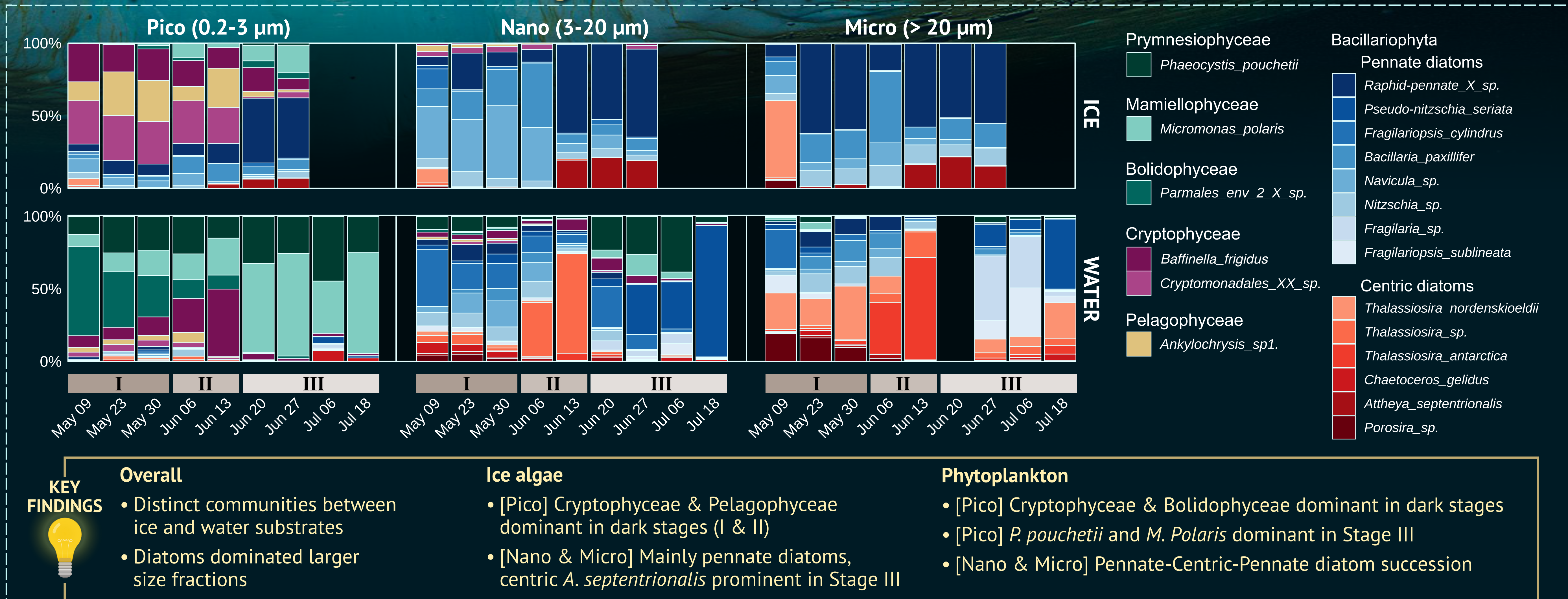
2. Environmental Conditions



3. Sample Processing

- Samples size fractionated
- DNA extracted
- 18S V4 barcode amplification
- Taxonomic assignment of ASVs with PR2 to obtain original sample diversity
- Filtered for photosynthetic taxa

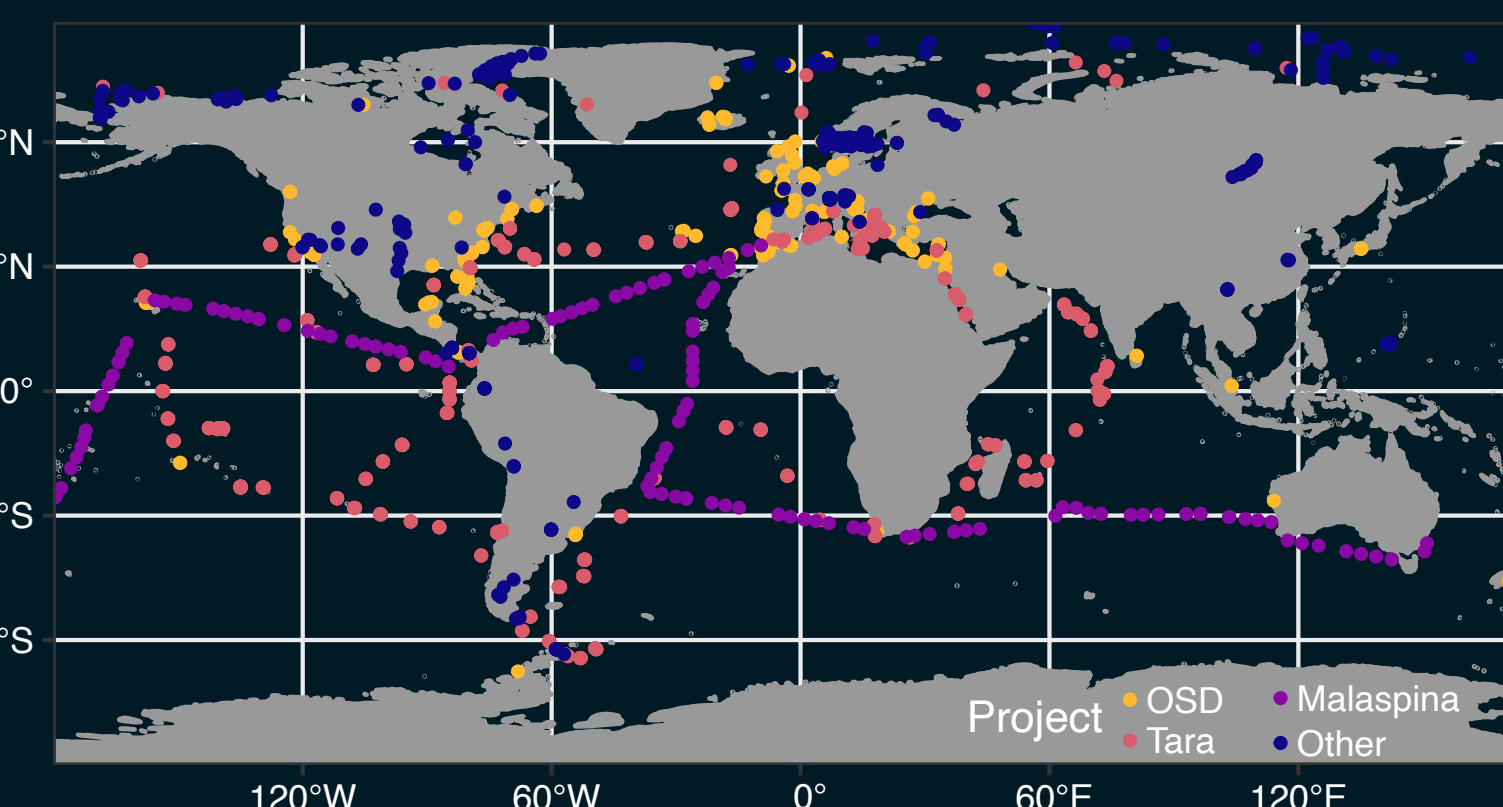
4. Temporal Evolution of Ice Algae and Phytoplankton



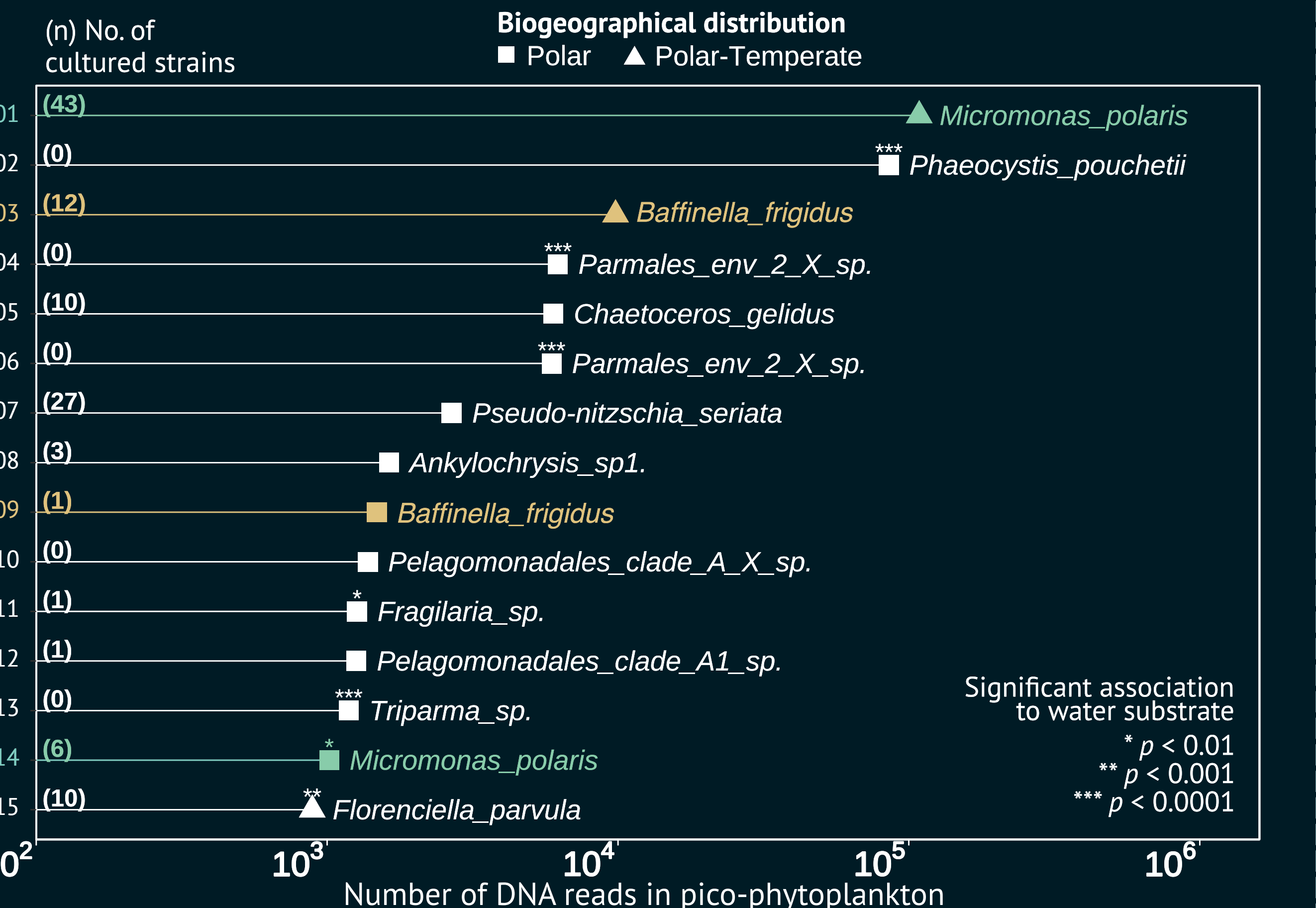
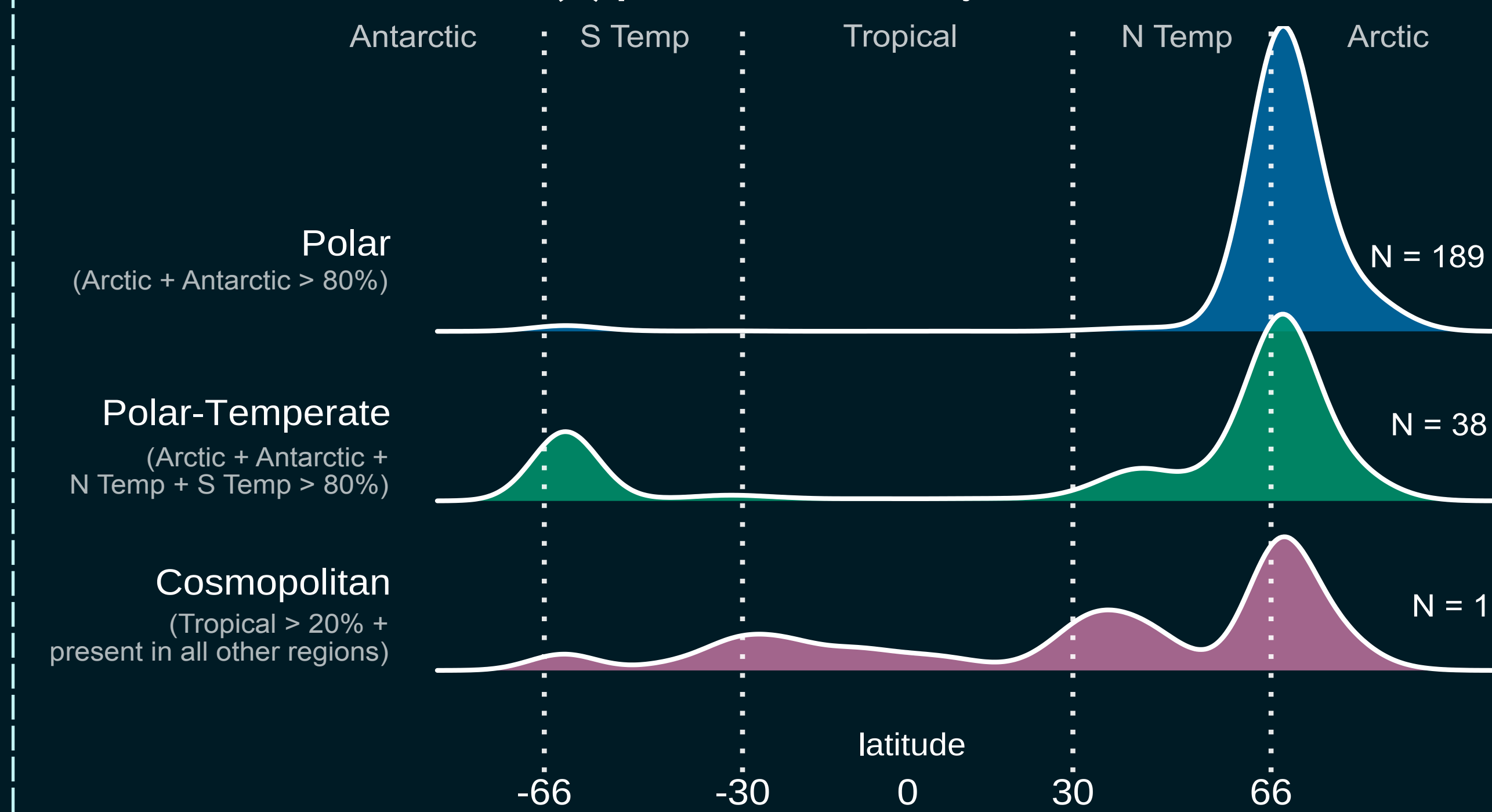
5. Biogeographical Distribution of Key Taxa

Assigning biogeography using global analysis of metaPR2 samples

- 2544 metabarcoding samples (right) with standardised processing
- ASVs clustered (cASV) and categorised based on latitudinal bands
- 1 cosmopolitan ASV *Phaeocystis* sp.



Global distribution of ASVs (N) present in this study



- Abundant ASVs have polar to temperate distribution
- Microdiversity (substrate-specificity & biogeography) in *M. polaris* and *B. frigidus*
- The under-ice photosynthetic community may be shifting due to climate change and needs to be studied more intensively

Key References
[1] Arrigo et al. (2014). Phytoplankton blooms beneath the sea ice in the Chukchi sea. Deep-Sea Research II, 105.
[2] Massicotte et al. (2020). Green Edge ice camp campaigns: understanding the processes controlling the under-ice Arctic PSB. Earth System Science Data, 12.
[3] Vaultot et al. (2022). A database of eukaryotic 18S rRNA metabarcodes with an emphasis on protists.
[4] Ardina et al. (2020). Environmental drivers of under-ice phytoplankton bloom dynamics in the Arctic Ocean. Elementa Science of the Anthropocene, 8.
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