

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

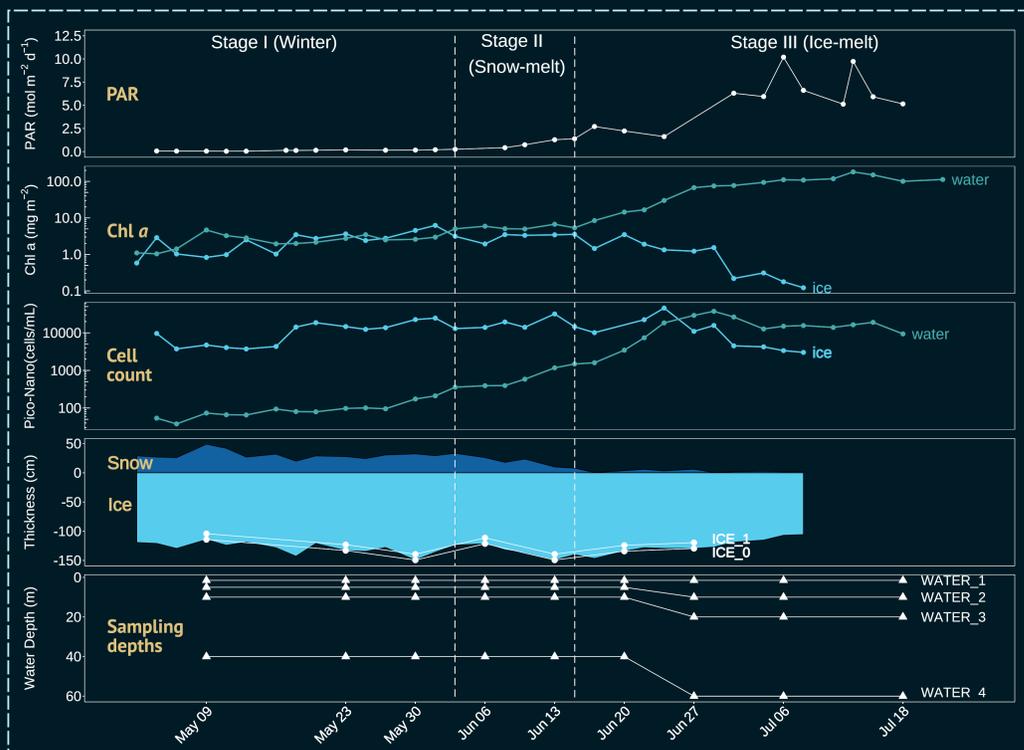
- How do the ice algae and phytoplankton communities evolve throughout the bloom?
- What are the biogeographical distributions of key taxa?

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)



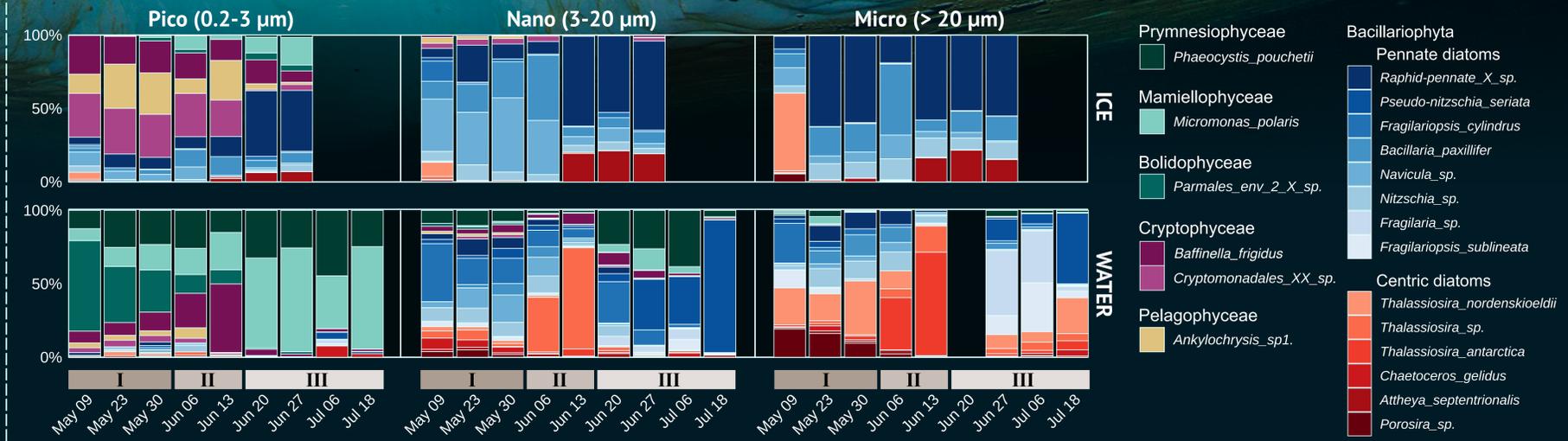
2. Environmental Conditions



3. Sample Processing



4. Temporal Evolution of Ice Algae and Phytoplankton



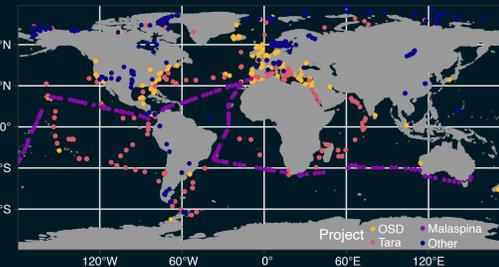
KEY FINDINGS

- Overall:** Distinct communities between ice and water substrates; Diatoms dominated larger size fractions.
- Ice algae:** [Pico] Cryptophyceae & Pelagophyceae dominant in dark stages (I & II); [Nano & Micro] Mainly pennate diatoms, centric *A. septentrionalis* prominent in Stage III.
- Phytoplankton:** [Pico] Cryptophyceae & Bolidophyceae dominant in dark stages; [Pico] *P. pouchetii* and *M. Polar* dominant in Stage III; [Nano & Micro] Pennate-Centric-Pennate diatom succession.

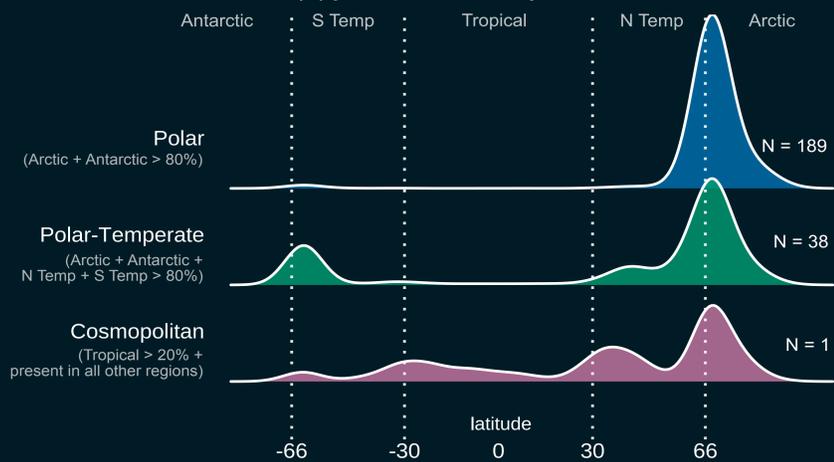
5. Biogeographical Distribution of Key Taxa

Assigning biogeography using global analysis of metaPR2 samples

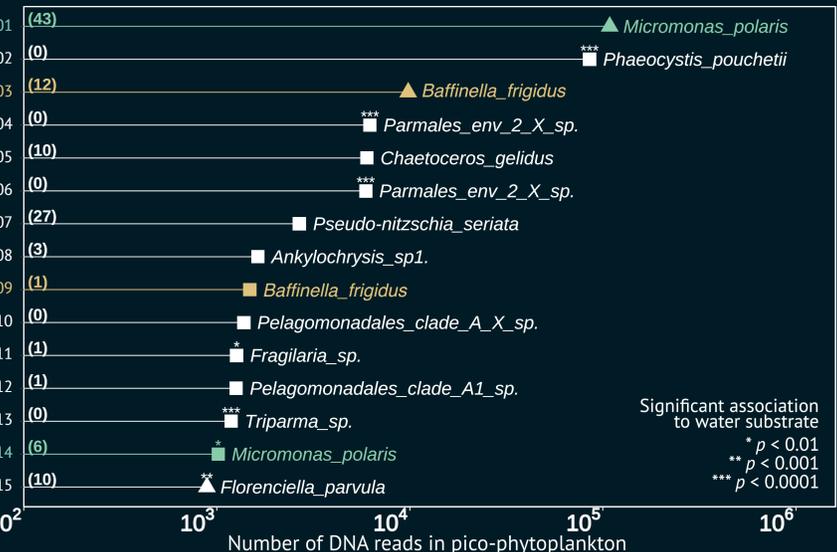
- 2544 metabarcoding samples (right) with standardised processing
- ASVs clustered (cASV) and categorised based on latitudinal bands
- 1 cosmopolitan ASV *Phaeocystis* sp.



Global distribution of ASVs (N) present in this study



(n) No. of cultured strains



KEY FINDINGS

- 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

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