



Assessing Phytoplankton Activities in the Seasonal Ice Zone (SIZ) of the Greenland Sea

Mayot et al (2018) - *Journal of Geophysical Research: Oceans*.

Background

- In situ observations in the SIZ over a year are lacking in this hard-to-reach environment, and where the presence of sea ice prevents accurate ocean color retrieval.
- In the SIZ, phytoplankton spring bloom occurs at the ice edge, but it has been shown that a significant phytoplankton biomass could also be present under ice.

Analysis

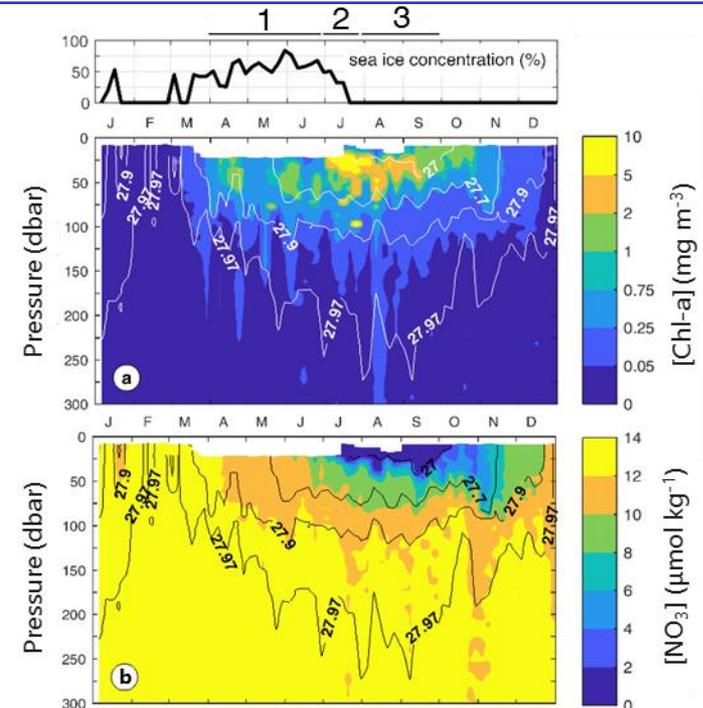
- Quantify and understand the importance of the different phases in phytoplankton activity occurring in the SIZ with Biogeochemical-Argo floats (BGC-Argo floats), able to sample under the ice, and satellite-based estimates of sea ice concentration and phytoplankton biomass.

Findings

- Annual time series of biogeochemical variables indicate three phases in phytoplankton activity (figure): pre-bloom under-ice (1), ice-edge bloom (2) and post-bloom (3).
- Phytoplankton grows equally well under sea ice as at the ice-edge, and a significant subsurface (> 30 m) phytoplankton biomass is observed during summer.

Significance

- The early pre-bloom under-ice phase and the ice-edge bloom phase represent, respectively, 23% and 13% of the annual phytoplankton biomass, and 52% and 40% of the annual Net Community Production.
- Satellite-based estimates of phytoplankton production may be biased in the SIZ of the Greenland Sea, because phytoplankton activities under ice, as well as in subsurface in summer, are undetectable via satellite.



Time series of (a) chlorophyll-a and (b) nitrate concentrations in 2012 from BGC-Argo float data. Black isolines correspond to the potential density (kg m^{-3}). (Top panel) Sea ice concentration from satellite passive microwave data. Due to the presence of sea ice from March to July, no data available in surface.