

ARCTIC 2023 – PROJECTS SELECTED FOR IMPLEMENTATION

Assessing Impacts of Phytoplankton Community Changes in Two Climate-Sensitive Arctic Ecosystems (PhytoChAOs)

INSTITUTION

Dr Florian Koch, AWI, DE

ABSTRACT

Due to global warming, the Arctic is experiencing rising temperatures resulting in the thawing of permafrost soil and an increase of glacial mass loss. These processes are expected to increase the flux of inorganic and organic nutrients into coastal ecosystems, reduce the salinity of surface waters, and change light conditions of the water column. Together, these environmental changes can affect the composition and distribution of the plankton community, likely favoring harmful algal species and associated phycotoxins. These harmful algae can impact public health and the economy of areas dependent on arctic resources. This project aims to establish a baseline of the phytoplankton community composition in two understudied Arctic systems heavily impacted by global warming: fjord systems with melting glaciers and coastal ecosystems impacted by permafrost thawing. To that end, oceanographic parameters (e.g., dissolved nutrients and organic carbon) that shape the phytoplankton community, as well as dissolved and particulate phycotoxins, will be measured. Particulate phycotoxins will be studied at the producer level (phytoplankton) and at the zooplankton level (natural phytoplankton predators) to address transference and conversion of phycotoxins in the first levels of the trophic web. Additionally, onboard bottle incubation experiments will be carried out to determine which nutrients (nitrogen, phosphorus, silicate, vitamins) may limit primary production and shape the phytoplankton community composition. Results obtained from this project will highlight possible plankton community shifts and their drivers and help predict future consequences of global warming in these two sensitive and changing arctic ecosystems.