

# **Climate effects on planktonic food quality and trophic transfer in Arctic marginal ice zones (MIZ)**

Project manager: Jørgen Berge, UNIS

## **Project summary**

This project will investigate how increased light intensities, due to reduced ice concentrations and ice extent, affect timing, quantity and quality of primary and secondary production in the Arctic marginal ice zone (MIZ). The MIZ is the key productive area of Arctic shelf seas. The ongoing warming of Arctic regions will lead to a northward retreat of the MIZ, and to an earlier opening of huge areas in spring. This may result in a temporal mismatch between the phytoplankton spring bloom and zooplankton reproduction. Less ice will also reduce the ice algae production that may be an important food source for spawning zooplankton prior to the phytoplankton spring bloom. Quantity and quality of primary production in seasonally ice-covered seas is primarily regulated by light and nutrients. Excess light, however, is potentially detrimental for algae and can reduce algal food quality. A decrease in the relative amount of essential polyunsaturated fatty acids (PUFAs) in algae due to excess light may affect the reproductive success and growth of zooplankton, and thereby the transport of energy to higher trophic levels, such as fish, birds, and mammals. We will carry out an extensive field campaign in spring, land based in the high Arctic fjord Rijpfjorden (Nordaustlandet, Svalbard), to follow the development in biomass and food quality of ice algae, phytoplankton and secondary production before, under and after ice break up. The copepod *Calanus glacialis*, the key herbivore in Arctic shelf seas will be used as target species for secondary production. The role of PUFAs for the reproductive success of *Calanus*, as well as the algal potential for acclimation to high and shifting light intensities will be studied in controlled laboratory experiments in Ny Ålesund (Marine Laboratory) and Longyearbyen (UNIS). Ultimately, this study aims to predict food web effects of reduced ice concentrations and ice cover in Arctic shelf seas, such as the Barents Sea.