

Will *Calanus finmarchicus* outcompete *C. glacialis* in a future warmer Arctic?



Three *Calanus* species co-exist in Svalbard: *Calanus hyperboreus* (upper), *C. glacialis* (middle) and *C. finmarchicus* (lower). These three species comprise up to 90% of the zooplankton biomass in Svalbard. In this project the species distribution and reproductive success will be studied. It involves regular field sampling and laboratory analyses (Photos JE Søreide).

Increases in water temperatures and a reduction in sea ice will result in a more predictable underwater light climate and widen the seasonal window for primary production (Leu et al. 2015; Renaud et al. 2018). This will improve the living conditions for boreal zooplankton in the Arctic. Data collected during AB-202 cruises every May since 2015 and regular sampling from Isfjorden will provide new insights into potential physical and biological factors that may limit the expansion of boreal zooplankton (e.g. *C. finmarchicus*) into the Arctic.

In this project the candidate will focus on the distribution and reproductive success of the two co-occurring *Calanus* species; the Arctic *C. glacialis* and the North Atlantic *C. finmarchicus*. *Calanus* species composition will be investigated with morphological and molecular tools, and egg production will be investigated by traditional 24 hrs egg production measurements from March to August 2021 and pooled with previous egg production data from other years with potentially different environmental conditions. Data will be synthesized and the following working hypotheses will be tested:

C. glacialis has higher egg production rates and higher percentage of egg producing females in Arctic vs Atlantic dominated waters

C. glacialis starts to reproduce earlier than *C. finmarchicus* since it is capable of capital breeding

C. finmarchicus is primarily an income breeder and will start to reproduce later in the season during peak to late bloom conditions

This project include:

Regular field work – sampling from small boats

Lab work – zooplankton community analyses, egg incubations and DNA extraction and PCR
Sample analyses and writing (thesis written as a scientific paper with extended Materials and Methods section)

Writing – thesis written as a scientific paper (with extended Materials and Methods section)

Background needed: Bachelor's in biology, familiar with zooplankton and molecular methods is an advantage, and the same is the knowledge to the statistical program R (free software)

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