Vertical distribution of pelagic fish and zooplankton under the European Arctic pack ice

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Introduction

Fish composition and distribution are thought to change in the Arctic Ocean following climate change. Boreal species are extending their northern range, and together with sea ice reduction, it could modify the life cycle and distribution of the key forage fish Arctic cod (Boreogadus saida). The potential migrations and occurrence of Arctic cod under the ice remain poorly documented in the European Arctic Ocean. Here, we document the vertical distribution of pelagic organisms under the pack ice in the European Arctic.

Materials and Methods

Fish were absent under the ice, but formed a dense mesopelagic sound scattering layer at depth (350 m – 550 m), and some schools (160 m – 220 m)

From previous trawl studies in the area we identified several suspects that could form the mesopelagic layer:

- Arctic cod (Boreogadus saida)
- Capelin (Mallotus villosus)
- Glacier lantern fish (Benthosema glaciale)
- Daubed shanny (Leptoclimis maculatus)
- Juvenile fishes without swimbladders (Reinhardtius hippoglossoides, Anarhichas lupus)
- Amphipods (Themisto spp.)
- Ctenophores (Beroe cucumis)

Potential targets for the -72 dB peak
- Length = 2.6 cm

Potential targets for the -52 dB peak
- Length = 14.2 cm
- Length = 8.2 cm

The TS analysis suggests a mix of macrozooplankton and fish species corresponding to previous net samples

Mesozooplankton aggregated in the surface layer (first 50 m) and right under the ice

Future Work

- Analyze net and video data to identify under ice zooplankton and confirm the absence of larval or juvenile fish
- Acoustic multifrequency analysis to gain further insights on species composition
- Quantify zooplankton and fish biomasses