

Isfjorden Marine Observatory Svalbard (IMOS): World's northernmost time-series on zooplankton



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Isfjorden is located at 78 °N and is the largest fjord in Spitsbergen, Svalbard. This fjord displays a climate–gradient from the ice-free outer part influenced by warm Atlantic water to the seasonal ice-covered inner part (Billefjorden) dominated by cold Arctic water (<-1°C) year-round. Since 2001, the University Centre in Svalbard, has studied the zooplankton community in Isfjorden through their regular course activities and research. In the FACE-IT project, we compile these spring, summer, autumn and winter zooplankton data to differentiate between natural variability and persistent climate changes in Arctic zooplankton communities.

IMOS time series – Main Goal

Establish a high-Arctic time series that captures seasonal and interannual variability to determine persistent changes in zooplankton biodiversity and community structures with global warming.

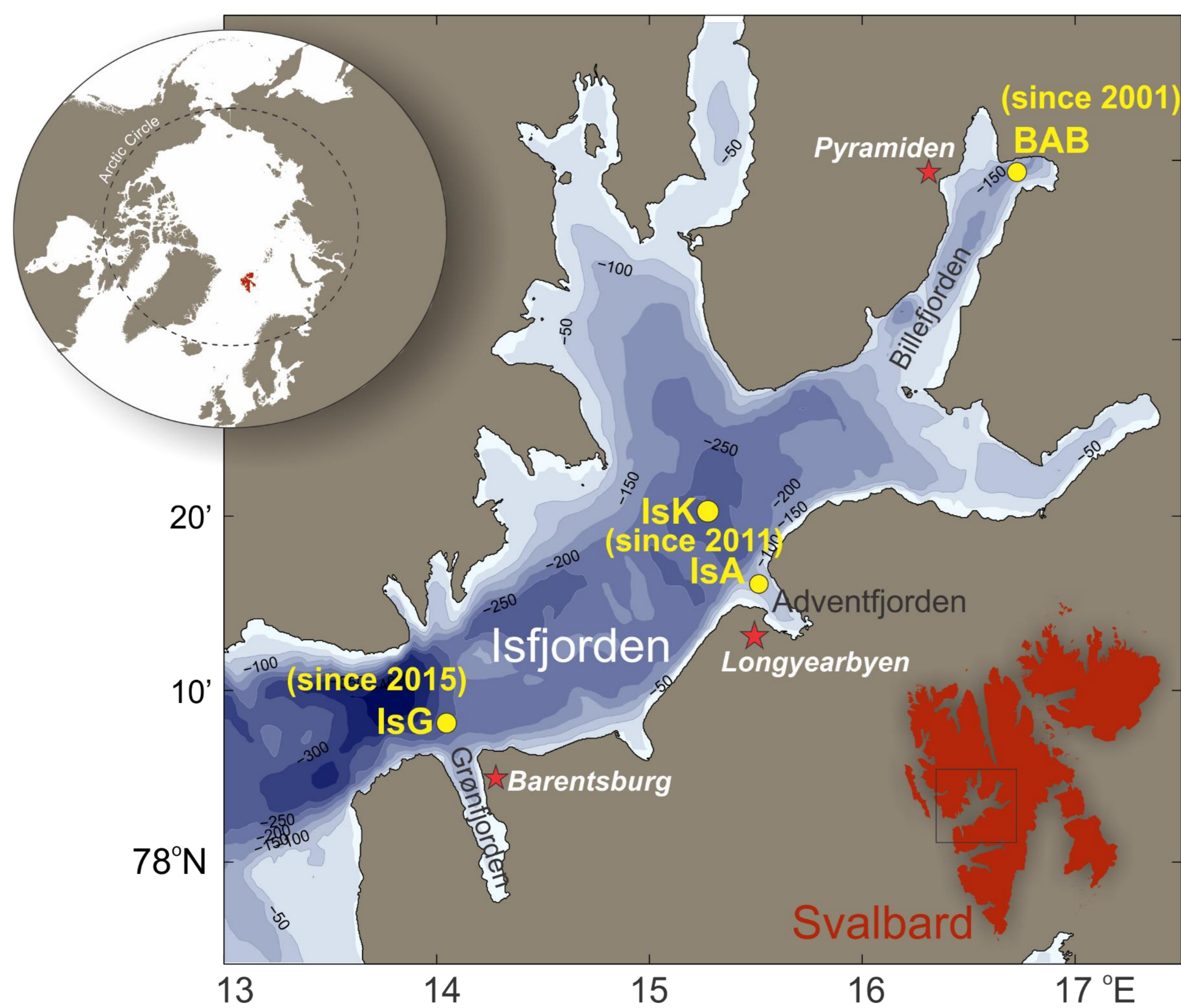


Fig. 1 Isfjorden Marine Observatory Svalbard and the main stations with time series start (year) shown in brackets.

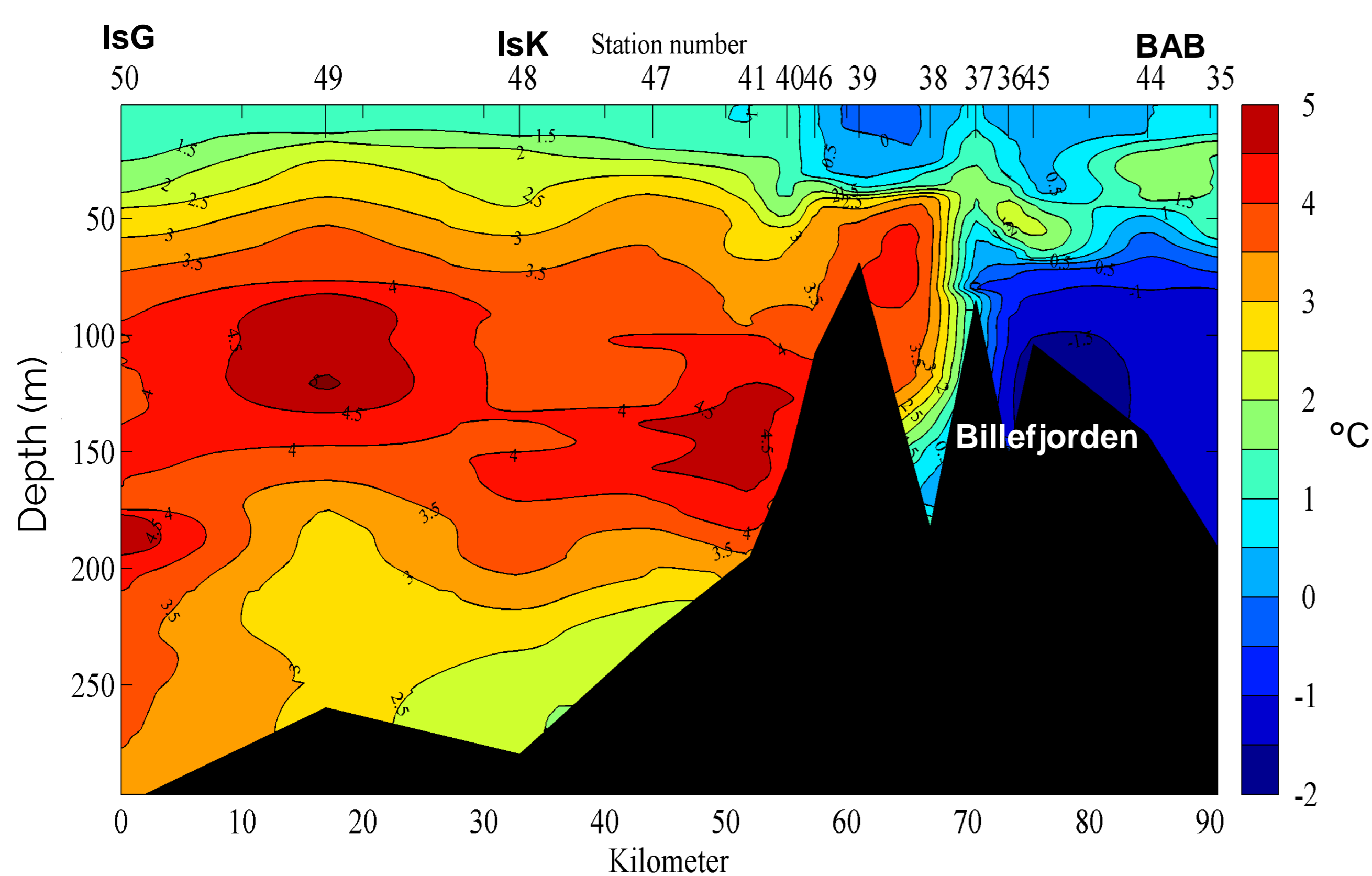


Fig. 2 Isfjorden temperature-plot from December 2015. Isfjorden displays a climate gradient from the warm ice free outer part influenced by warm Atlantic water to the seasonal ice covered inner part (Billefjorden) dominated by locally produced cold water (Arctic water).

Isfjorden Zooplankton Community

Boreal species dominate the zooplankton community in the warm outer part (Shelf, Mouth and IsG) and Arctic species in the cold inner (BAB) part (Fig. 3).

The seasonal variability is stronger than the interannual and the zooplankton community reset to a more Arctic one over the winter due to high mortality (low abundance in May).

Warmer sea temperatures and less sea ice has so far had a positive impact on both boreal and Arctic species in Isfjorden (Fig. 4)

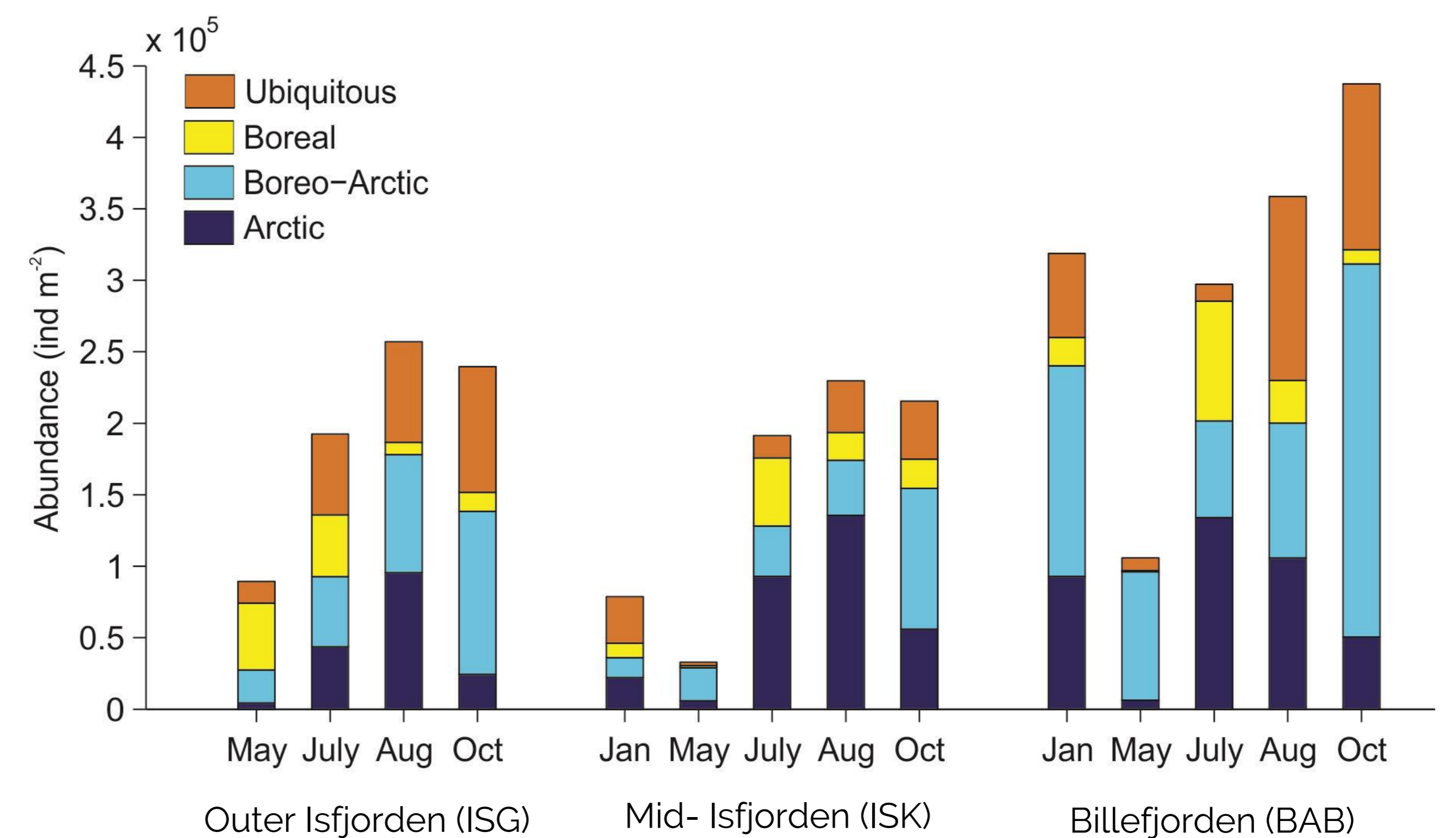


Fig. 3 Zooplankton composition along the Isfjorden transect in 2016 according to species zoogeographical preference. Ubiquitous = common everywhere.

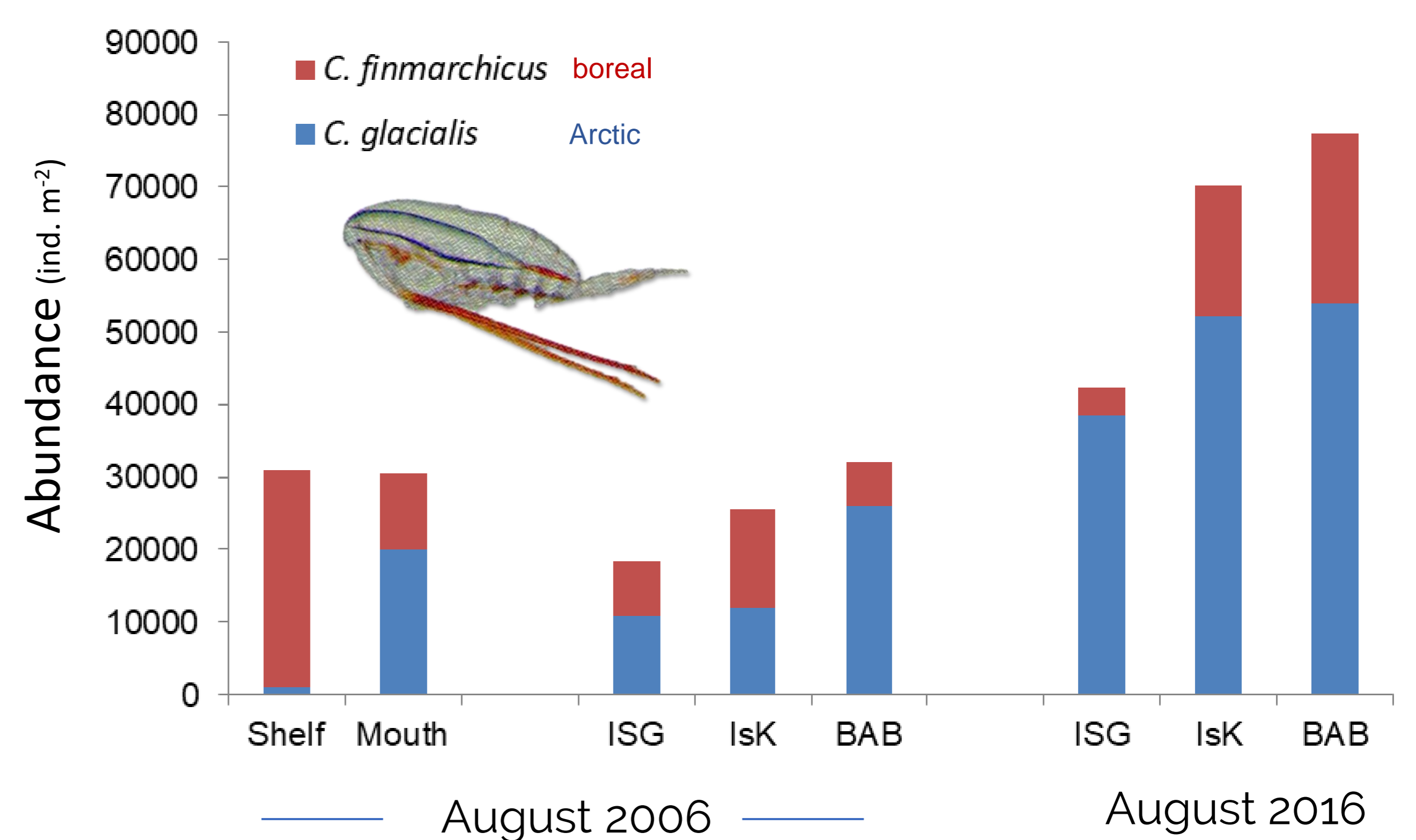
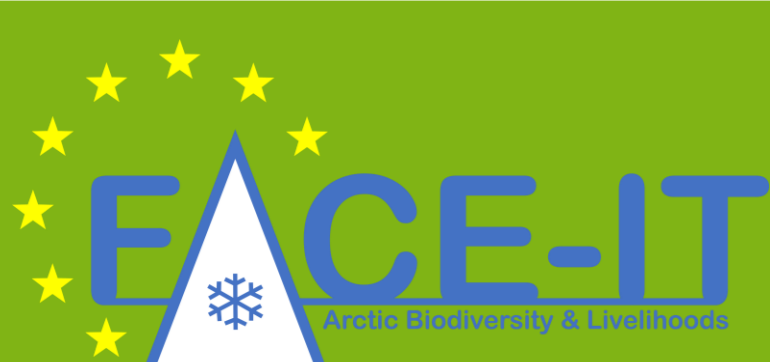


Fig. 4 Abundance of the North Atlantic (boreo-Arctic) copepod *Calanus finmarchicus* and the Arctic *C. glacialis* in Isfjorden in autumn 2006 versus autumn 2016. Shelf is located just outside Isfjorden, Mouth in the entrance and see Fig. 1 and 2 for station locations IsG, IsK and BAB.

Less sea ice and warmer sea temperatures have so far had a positive impact on both boreal and Arctic zooplankton. There is an ongoing borealisation (= Atlantification) of the Isfjorden zooplankton community BUT not as fast as anticipated since the long dark Arctic winter slows down or prevent boreal species to establish own successful populations.



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