Will climate warming impact the size structure of Arctic benthic communities? - benthic biomass size spectra along latitudinal gradient (60 – 80°N)

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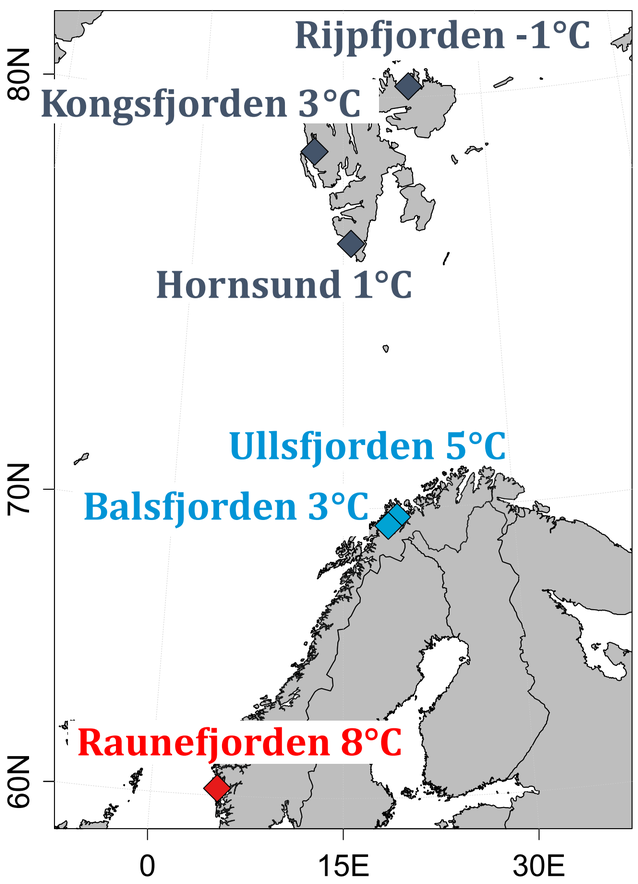
Introduction

Body size is a fundamental biological unit that is closely coupled to key ecological properties and processes. Decline in organisms' body-size has been recently predicted to be "the third universal response to global warming" (alongside changes in phenology and distribution of species) in both aquatic and terrestrial systems. The patterns of spatial variability and drivers of size structures at the community level are still rarely studied, particularly for benthic communities. Here we present the first study of benthic biomass size spectra along the latitudinal/thermal regimes gradient spanning the continental Norway and Arctic fjords. We apply the "space for time analogue' approach to determine possible future effects of climate warming on size structures in Arctic benthic communities.

Methods



Meiofauna

Box-corer

32µm sieve

Ludox centrifuged

Identification to higher taxa

Over 9 000 individuals measured

Sampling

Macrofauna

Van Veen grab

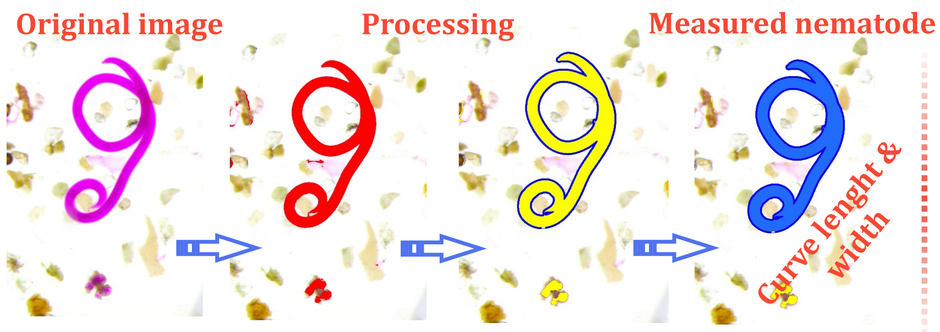
500µm sieve

Identification to possibly lowest level

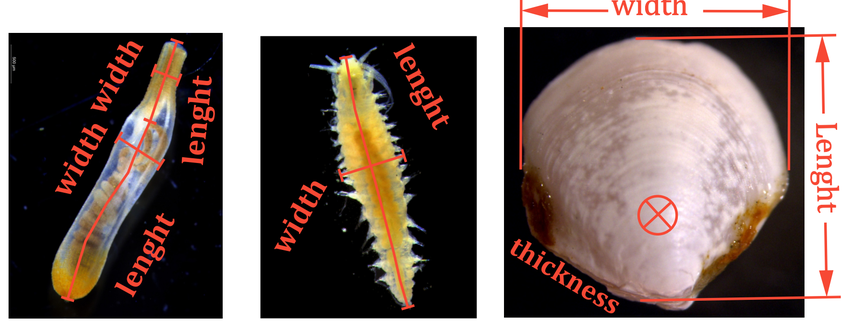
Over 17 000 individuals measured

Measurements of individuals

Semi-automated for nematodes and manual for other groups



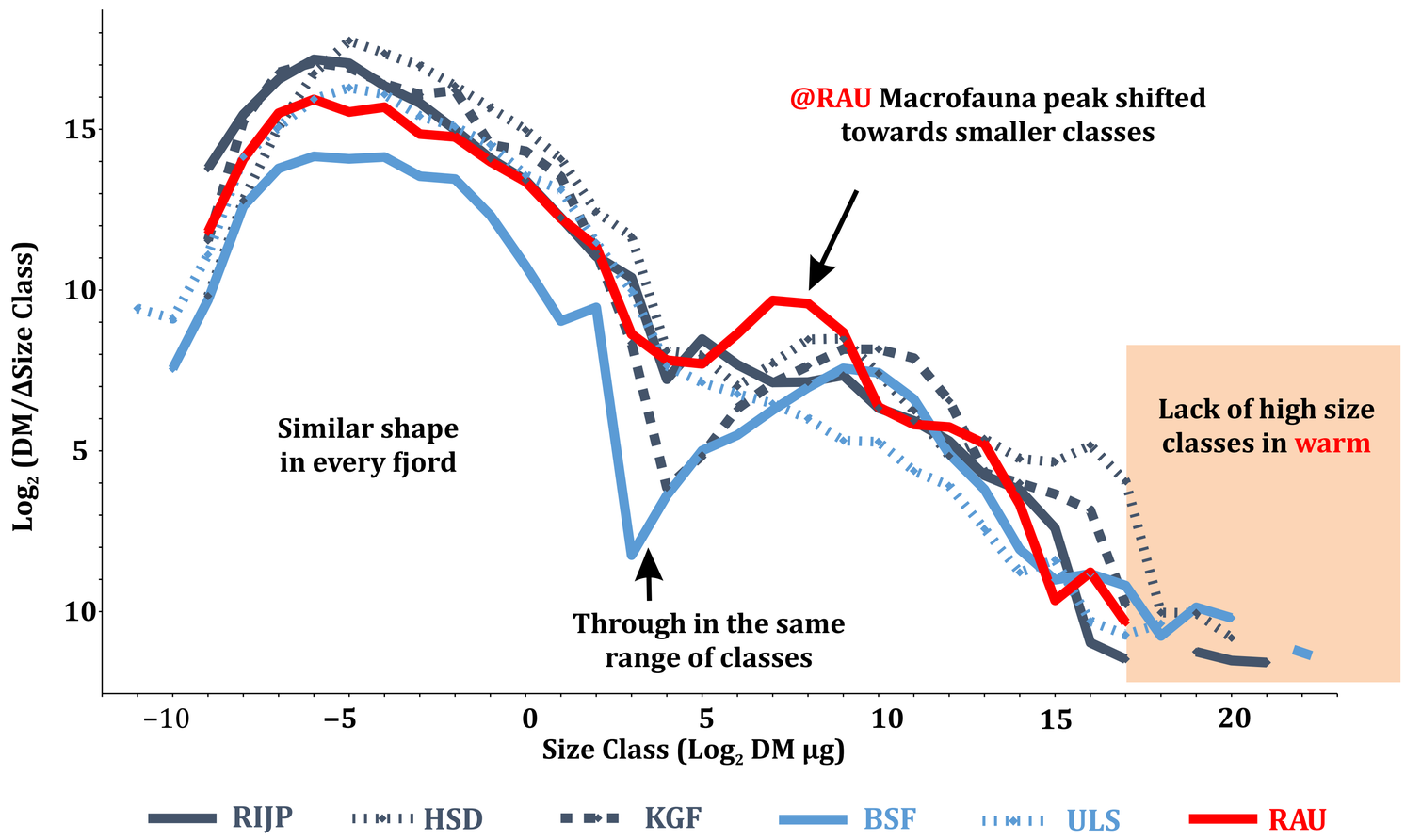
Mazurkiewicz M., et al., 2016. Assessment of nematode biomass in marine sediments: A semi-automated image analysis method. Limnol. Oceanogr. Methods, 816–827, doi:10.1002/lom3.10128

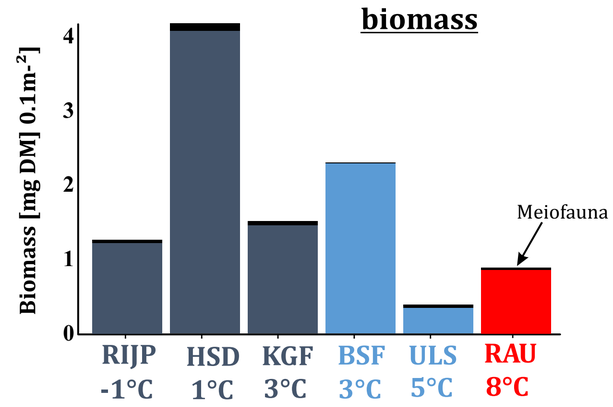


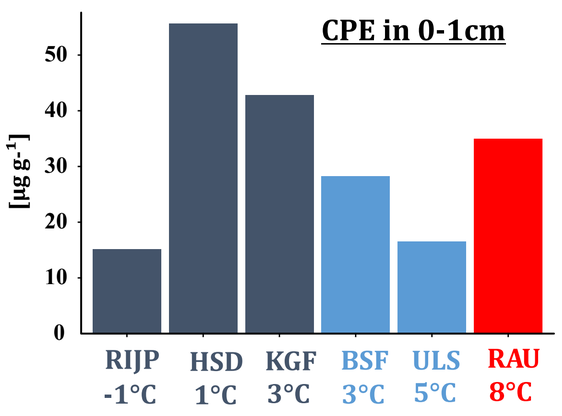
Lenght of fragmented polychaetes calculated on basis of regression formulas: lenght ~ width of n^{th} anterior cheatiger (Górska et. in prep)

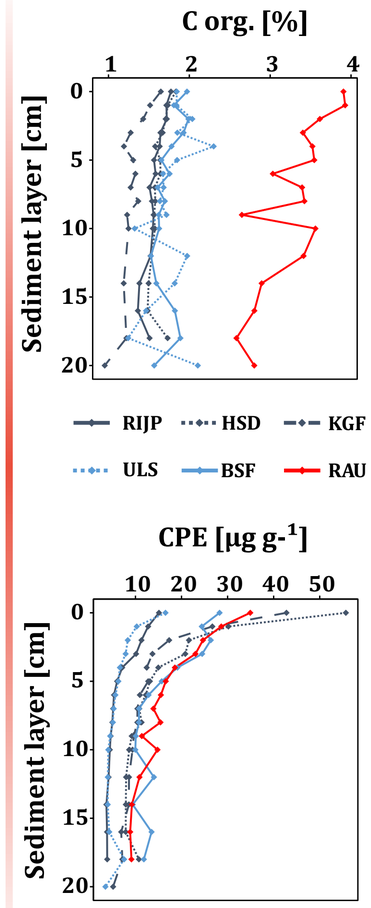
Dimensions ⇨ Biovolume ⇨ Wet Mass ⇨ Dry Mass

Results & Conclusions









The total biomass of benthic fauna over investigated area reflects a variability of CPE concentration in surface layers of sediments

The size structure of benthic fauna is very conservative irrespective of temperature regimes. Shape of size spectra is similar in all studied fjords with pronounced through between 4^{th} (16µg) and 6^{th} (64µg) size class. There is sensible lack of high size classes >17^{th} (131mg) in warmer fjords