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Quality and sources of food for benthic communities in the two Arctic fjords

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INTRODUCTION

The aims of the study were to assess quantity and sources of food for benthic communities in two Arctic fjords: Hornsund (H) and Kongsfjorden (K) (Svalbard). Hornsund is influenced by water masses of Arctic origin (Sorkapp Current) while Kongsfjorden is influenced by warm West Spitsbergen Current (WSC).

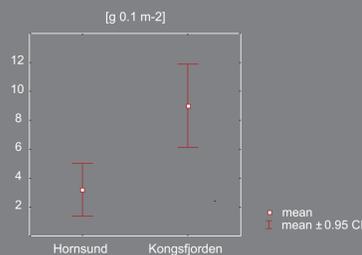
MATERIALS AND METHODS

Three sampling stations, localized in central part of the each fjord were selected for comparison. Sampling was performed in 2013 during r/v Oceania cruise. Water masses, currents speed, sedimentation rates and nutrients concentration were characterized. To establish food sources phytoplankton, zooplankton, macro- and microphytobentos, debris of terrestrial plants as well as suspension and surface sediments were collected. Over 30 species of macrofauna were collected to study functional diversity of the benthic community. Samples were analyzed for organic carbon and nitrogen and their isotopes ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$).



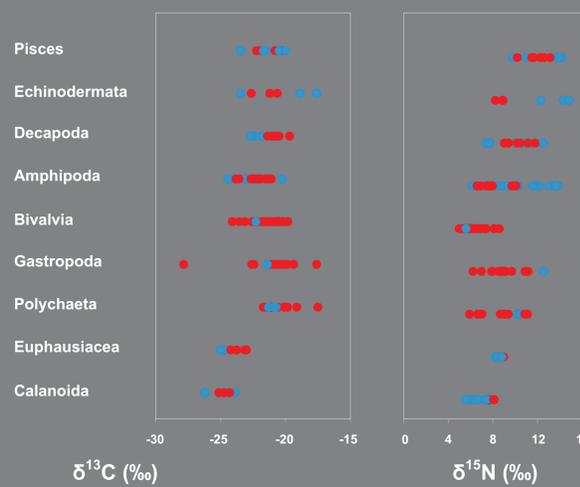
RESULTS AND DISCUSSION

Benthic biomass

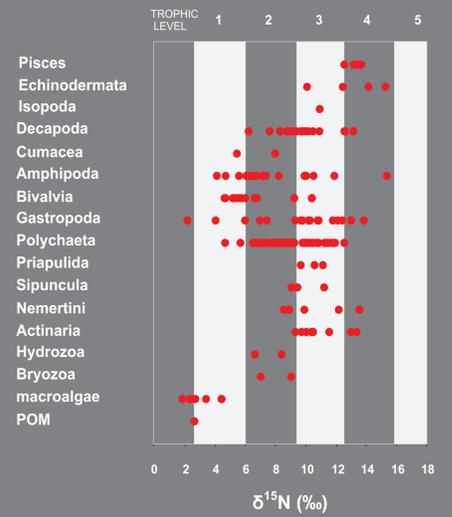


In Kongsfjorden, despite lower content of organic carbon in sediments than in Hornsund, macrobenthos biomass was higher, which probably reflected a better quality of marine organic matter. Planctonic and benthic organisms displayed a wide ranges of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ signatures (-26.2 to -17.5 ‰ and 4.9 to 14.8 ‰, respectively). Benthic organisms encompassed over 4 trophic levels during summer in Kongsfjorden.

Carbon and nitrogen isotopic ratios of the species studied

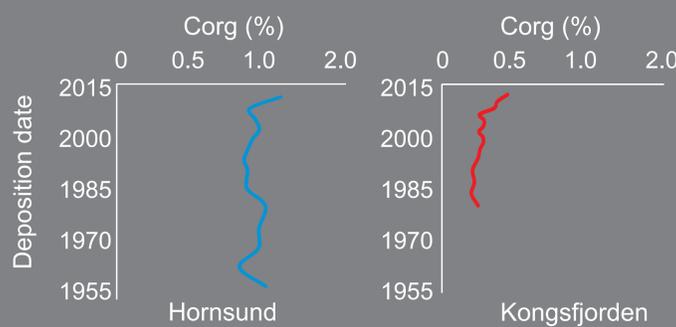


Summer benthic food-web in Kongsfjorden

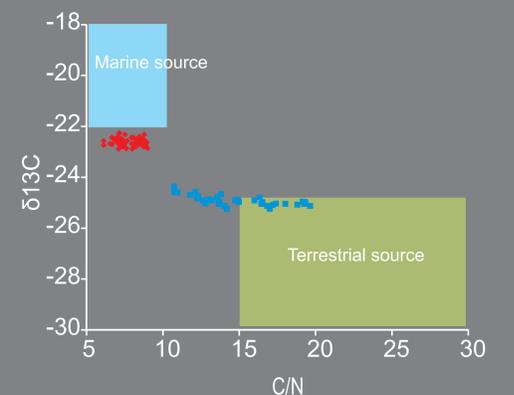


Sedimentary organic carbon concentration was higher in "colder" Hornsund (1-1.6%) and much lower in "warmer" Kongsfjorden (0.2-0.6%). Sedimentary C/N ratio ranged from 8.2 to 18.7 in Hornsund and from 6.7 to 10.6 in Kongsfjorden. The $\delta^{13}\text{C}$ in sediments ranged from -22.3 ‰ to -23.6 ‰ in Kongsfjorden and -23.9 ‰ to -25.4 ‰ in Hornsund. In "warmer" Kongsfjorden the organic carbon of marine origin prevailed but its concentration was over 3 times lower than in Hornsund. Hornsund sediments are enriched in carbon of terrestrial origin.

Sedimentary Corg concentration



C/N ratio versus d13C in marine sediments



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