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SMALL- AND MESOSCALE VARIABILITY OF BENTHIC FOOD WEBS IN ARCTIC

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Knowledge of trophic linkages among organisms is a fundamental requirement to understanding energy flow through food webs from primary carbon fixation through upper trophic-level consumers. Determining trophic links within vast, highly connected marine food webs with a lot of generalists feeders and high degree of omnivory may be very challenging, but in the last two decades understanding of trophic interactions within marine food webs has expanded considerably thanks to the use of biomarkers such as lipids and stable isotopes ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) that provide dietary information integrated over periods of weeks to months. In Arctic coastal waters strong gradients of environmental settings and biological processes result in a coexistence of distinctly different benthic communities, therefore clear differences in structure and functioning of benthic food webs may be expected between neighboring habitats. Recognition of the level of different scale variation of organic matter properties and trophic relationships is crucial to the food web studies and must be known before the picture of the regional patterns can be drawn. Polar food web studies, however, are usually based on materials from single sites therefore fail to account for local scale variability.

The goal of this study is to utilize lipid and stable isotopes analyses to describe and compare benthic food webs on two spatial scales: between two west Spitsbergen fjords that are differently exposed to present warming (Hornsund 77°N and Kongsfjorden 79°N) and within the single fjord system (highly disturbed glacial bay and main fjord basin open to shelf waters, Hornsund). Samples were collected during summer cruises of r/v 'Oceania' in 2012 and 2013. Our material covered several taxonomic groups of benthic taxa and samples of the potential food sources (sediment particulate organic matter - SOM, pelagic particulate organic matter – POM, macroalgae and zooplankton). The stable isotope mixing model SIAR (Stable Isotope Analysis in R) was also used to evaluate the relative contribution of different organic matter sources to several taxonomic and trophic group with respect to their habitats. The overall fatty acid profiles, levels of the selected fatty acid trophic markers and isotopic composition differed markedly among taxa studied suggesting utilization of different food sources.

The results of the study are discussed with regard to the possible changes in benthic food webs in the course of the climate-warming induced modifications of environmental settings and biotic components of Arctic fiordic systems.