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BENTHIC BIOMASS SIZE SPECTRA - A TOOL TO IDENTIFY BIOTIC RESPONSE TO ENVIRONMENTAL CHANGE IN THE ARCTIC?

Maria WlodarskaKowalczuk *(Institute of Oceanology Polish Academy of Sciences, Poland)*
Barbara Gorska *(Institute of Oceanology Polish Academy of Sciences, Poland)*

maria@iopan.gda.pl

Changes in organisms' body-size has been recently predicted to be the third universal response to global warming. The climate changed induced changes in water temperature, productivity and glacial meltwater inflows can result in modification of size structure in benthic communities and thus influence the functioning of the Arctic marine ecosystems. Benthic communities play an important role in the ocean carbon cycle by continuous redistribution of organic matter and nutrients and so the assessment of the benthic size structure and related benthic productivity can largely increase our understanding of carbon flow and functioning in ocean ecosystems.

Benthic Biomass Size Spectra (BBSS) is an important descriptor of functioning of the community, especially in terms of productivity and energy flow. The aim of the study is to determine the changes in structure (biomass size spectra) and function (secondary production) of benthic communities in response to spatial variability of environmental conditions in the Arctic coastal waters. We hypothesize that carbon supply and natural disturbance (produced by glacial inflows of terrygenic materials) are important factors shaping benthic size structure and production in Arctic sediments.

The present study is the first assessment of the patterns and environmental controls of BBSS (across both meio- and macrofauna) in Arctic fjord sediments. Here we present the BBSS patterns in soft sediments of two fjords off west Spitsbergen – one influenced by the warm Atlantic waters of west Spitsbergen Currents (Kongsfjorden) and one of more "Arctic" character – influenced by waters transported from the Barents Sea by East Spitsbergen Current (Hornsund). BBSS in studied locations differ in terms of shape of size spectra and number of size classes. We can observe clear difference in BBSS between stations localized along the fiord axis – absence of the largest size classes in glacier-influenced area as well as differences in taxonomic and functional (feeding and mobility types) composition of the benthic fauna across the stations. The size structure data are also used to assess the productivity of the studied communities.

The results of this study indicate that BBSS in Arctic communities can respond to environmental changes. The quantification of the basic patterns as well as the recognition of the factors controlling the benthic size structure is crucial for understanding of the present day functioning and monitoring and prediction of global warming effects on Arctic benthic systems.