Geophysical Research Abstracts
Vol. 19, EGU2017-7053, 2017
EGU General Assembly 2017

Organic carbon storage and benthic consumption in sediments of northern fjords (60–80°N)

Maria Włodarska-Kowalczuk, Agata Zaborska, Emilia Jankowska, and Mikołaj Mazurkiewicz
Institute of Oceanology Polish Academy of Sciences, Sopot, Poland (maria@iopan.gda.pl)

Fjords have been recently recognized as hotspots of organic carbon storage, with organic carbon burial rates one hundred times larger than the global ocean average, accounting for 11% of global annual marine carbon burial (Smith et al. (2015) Nature Geoscience 8: 450-453). The organic carbon production and processing in coastal waters and sediments are controlled by environmental settings that are likely to be reshaped in the course of the global warming. The fastest and strongest changes are to occur in polar regions. In the present study we compare organic carbon stocks, accumulation and burial in temperate (Raunefjorden, Ullsfjorden, Balsfjorden) and Arctic (Hornsund, Kongsfjorden, Rijpfjorden) fjords located along the latitudinal/thermal gradient from the southern Norway (60 °N) to North of Svalbard (80 °N).

The sediment cores were collected at 3 to 5 stations within the central basin at 150-300 m in each fjord during r/v Helmer Hansen and r/v Oceania cruises in 2014 and 2015. Vertical patterns of grain size and organic matter content and sources (Corg concentration, stable isotope δ13C signature, photosynthetic pigments concentration) have been analyzed. Sediment accumulation rates have been estimated with use of 210Pb dating method. Fresh carbon accumulation rate was estimated based on organic carbon concentration is surface sediments and mass sediment accumulation rate. The variability in metazoan productivity and carbon consumption (calculated based on the macro- and meiobenthic species biomass spectra in samples collected at the same stations) was also assessed to explore the patterns of biological controls of carbon storage in sediments. Carbon burial was estimated by multiplying organic carbon concentration in deepest sampled sediments and mass sediment accumulation rate.

The effects of contrasting hydrological regimes and biological activity on the carbon storage in the studied fjords are discussed from the perspective of possible effects of climate warming driven changes on the Arctic fjordic sedimentary systems.