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BENTHIC ECOSYSTEM FUNCTIONING AND COUPLING PROCESSES IN THE SHALLOW LAPTEV SEA : EVIDENCE FROM BENTHIC TURNOVER RATES, BENTHIC AND PELAGIC PATTERNS

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In the face of the rate of recent environmental change in the Arctic Ocean, such as sea ice decline, there is an urgent need for rapid assessment of environmental consequences. Climate-driven change in sea-ice dynamics may lead to major ecological shifts, particularly in the vast area of shallow Arctic shelves and along the Transpolar Drift. Understanding both structure and functioning of marine ecosystems at regional and Pan-Arctic scale forms the basis for reliable predictions on the future of marine communities and related ecosystem services. Against this background, benthic ecosystem functioning and interchange processes are investigated within the joint Russian-German research project „Laptev Sea System“.

On the basis of previous studies, faunal and biogeochemical benthic investigations were performed during the expeditions TRANSDRIFT XXI and XXII of RV “Viktor Buynitskiy” to the Laptev Sea in late summer of 2013 and 2014. Benthic samples were taken by means of a multicorer at water depth between 36m and 264m. Sediment cores with inhabiting communities (bacteria, meiofauna, macrofauna) and overlying boundary water were incubated in a temperature-regulated fridge to quantify benthic respiration and, hence, carbon remineralization. Samples from the water phase were taken to determine nutrient remineralisation and turnover (e.g.. silicic acid, nitrate and phosphate) and analysed with respect to nutrient and oxygen concentrations in the lowermost water layers. Pelagic patterns (nutrients and composition of mesozooplankton communities) are investigated along central transects in the Laptev Sea.

First results revealed overall oxygen uptake rates between 2.5 and 6.1 mmol m^{-2} day^{-1}. The sediment-community respiration is estimated to lie between 2.0 and 5.0 mmol m^{-2} day^{-1} , thus in the lower range of rates determined in the Canadian Arctic at comparable water depth. While respiration rates indicate that the Laptev Sea is not characterized by a pronouncedly lower benthic ecosystem functioning (BEF) than other Arctic marginal seas, local differences between eastern and western Laptev Sea point to a distinctive pattern of benthic boundary fluxes. Ancient river valleys like Khatanga might act as local hotspots, driving coupling processes as well as interchange with neighbouring Arctic ecosystems.