



Carbon transformation and the sources of dissolved inorganic carbonate in sediments of a temperate coastal sea, the Baltic Sea: A stable isotope and modelling approach

Marko Lipka (1), Bo Liu (1), Antje Wegwerth (1), Olaf Dellwig (1), Vera Winde (1), Abdul M. Al-Raei (2), and Michael E. Böttcher (1)

(1) IOW, Geochemistry & Isotope Geochemistry, Warnemünde, Germany (michael.boettcher@io-warnemuende.de), (2) MPI Bremen, Germany

Organic matter is mineralized in brackish-marine sediments by microbial activity using predominantly and sulfate as electron acceptors. Under anoxic bottom water conditions, sulfate reduction dominates. Pore water profiles reflect net biogeochemical processes, transformation rates and fluxes of dissolved species across the sediment-water interface. Element fluxes across the sediment-water interface are controlled by different boundary conditions.

We present the results of a detailed biogeochemical investigation of interstitial waters from different sediments of the Baltic Sea covering the range of sedimentological and bottom water redox conditions. It was the aim to study the biogeochemical transformation processes and associated element fluxes at the sediment-water-interface and the role of organic matter or methane as potential substrates for microbial activity. Short sediment cores were collected during several research cruises with multicoring devices. Pore waters were analyzed for nutrients, major and trace element concentrations to allow a modelling of net volumetric transformation rates and diffusive element fluxes. Gross sulfate reduction rates were measured in selected cores using incubations with radiotracer. As a tracer for the source of dissolved inorganic carbonate (DIC) the carbon isotope composition was measured. A quantitative interpretation of vertical concentration profiles in the pore waters was performed using different modelling approaches. Element fluxes across the sediment-water interface show a dependence from bottom water redox conditions, sediment compositions, and sedimentation conditions. It is shown that the carbon isotope composition of DIC is a valuable and sensitive parameter in a model-based estimate of the impact of biological and physical mixing of surface sediments.

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