Processes controlling DI^{13}C in the water column and surface sediments of marginal seas

MARKO LIPKA[1], IRIS SCHMIEDINGER[1], BO LIU[1], VERA WINDE[1,2], MICHAEL E. BÖTTCHER[1*]

[1]Leibniz Institute for Baltic Sea Research, Warnemünde, FRG,michael.boettcher@io-warnemuende.de
[2]LUBW, Institute for Lake Research, Langenargen, FRG, vera.winde@lubw.bwl.de

The mineralization of reduced carbon leads to the production of dissolved inorganic carbon (DIC). We present here the results from a detailed isotope biogeochemical study of DIC in the water column and pore waters from three marginal seas: the Baltic Sea, the Black Sea and the North Sea. In the selected tidal areas of the North Sea, benthic-pelagic coupling via pore water exchange under impact of anaerobic methane oxidation as well as submarine ground water discharge take place. The isotope composition in the pelagic DIC shows a gradient between the North and the Baltic Sea, following the salinity during winter time. Element fluxes across the sediment-water interface depend on bottom water redox conditions, sedimentology and organic contents. Advective fluxes affect the top of permeable sediments, thereby modifying the pore water gradients. By means of non-steady state modelling of pore water profiles we are able to identify the impact of mixing processes and sedimentation events in the shallow southern Baltic Sea. Inflow events of oxic North Sea water may temporarily impact the central Baltic Sea. In the deep Black Sea, anaerobic processes control the distribution of DI^{13}C. The results indicate that the pore water composition in the sediments is controlled by the DIC release with carbon isotope signatures controlled by the oxidation of DOC or methane. Supported by BMBF during BIOACID and FONA-SECOS, DFG (cruises MSM33, MSM50 and MSM51), and Leibniz IOW.