Deep pore water geochemistry of tidal flat sediments

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Introduction

In tidal flats a substantial amount of water is incorporated in sediments as pore water. The concentrations of numerous elements in pore water are significantly altered as compared to sea water. Hence, a chemical characterisation of pore waters is an essential prerequisite to establish elemental mass balances for tidal flats.

Results

An increase in Mn concentration with increasing depth may be related to the reduction of Mn oxides occurring at about 2 m depths. Co and V are often associated with Mn oxides and therefore show a similar depth profile (Fig. 3, 4).

Fe oxides are supposedly reduced along the whole profile (Fig. 4). In the upper cm H₂S concentrations are low enough for the occurrence of Fe, which is fixed as FeS with increasing depth.

Concentrations of U and Mo decrease rapidly with depth (Fig. 5) which seems related to a removal from the pore water due to reducing conditions.

The concentration of DOC, NH₄⁺, and alkalinity all increase with increasing depth due to organic matter degradation, and the concentration of SO₄²⁻ decrease with depth (Fig. 6, 7).

Outlook

Trace metals, nutrients and DOC will be measured over the period of one year to gain a better understanding of processes responsible for the development of the observed depth profiles. Additional lances equipped with sensors measuring temperature, pressure and electrical conductivity will be installed in the sediment to assess advective fluxes within the sediment.

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