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Influence of diagenetic processes on the distribution and accumulation of major and trace elements in the sediments of the Scheldt estuary

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Sediment cores were carefully collected with a box corer in three areas of the Scheldt estuary (Antwerpen, Doel, Terneuzen) in August and repeated in December. The 20 upper cm were sliced under a nitrogen atmosphere in 0.5-1 cm thick layers. The slices were then centrifuged in order to separate the interstitial water from the solid phase. The following elements were determined in the solid phase Si, Al, Fe, Ca, Mg, Mn, Co, Zn, Cd, Cu, Pb, Corg and Norg. In addition, the following parameters were also measured in the pore waters: salinity, alkalinity, DIC, pH, DOC, NO₃, NH₄, PO₄, Si, Fe, Ca, Mg, Mn, Co, Zn, Cd, Cu and Pb. The results for one core taken as an example will be shown on the poster.

The vertical distribution of most major and minor elements remains rather constant except that of organic carbon whose concentration profile is scattered, reflecting the presence of thin mud layers and lenses in sandy deposits.

The vertical profile of dissolved elements in pore waters exhibit generally marked gradients linked to the bacterial degradation of organic matter imposing strongly reducing conditions below the water-sediment interface. This is demonstrated by the rapid decrease of nitrate, the release of manganese and iron and finally the consumption of sulfate. The concentrations of trace elements fluctuate markedly in relation to dissolution and precipitation reactions.

In order to obtain additional information on the speciation of trace elements, titration experiments of the solid phase by HCl have been performed during which the release of major and minor elements are measured. The similarity in behaviour between elements allow to demonstrate their close association. This is for example the case of Mn and Co; Zn, Cd and S²⁻; Cu and Al; Pb and Fe.

The use of a diagenetic model proposed by Yifenga and Van Cappellen (1996) is presently tested and tentatively improved to include the description of the behaviour of trace elements. Preliminary results will be shown.

W. Yifenga and Ph. Van Cappellen (1996) A multicomponent reactive transport model of early diagenesis: Application to redox cycling in coastal marine sediments. *Geochimica et Cosmochimica Acta*, 60, 2993_3014.