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Interpretation of Pore Water Profiles Affected by Intense Lateral Sediment Advection: Examples from the Argentinean and Uruguayan Continental Slope

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Pore water profiles in deep-sea sediments on the continental slope off Uruguay and Argentina display strong differences to what is usually observed in sediments below highly productive regions in the ocean. The main reason for this can be seen in the massive downslope transport of material by slides and turbidity currents from the continental shelf leading to very high sedimentation rates on the slope and in the basin. As a consequence, intense mineralisation processes occur at the sediment-water interface and within the deeper sediment layers. This can be observed over the whole continental slope and is de-coupled from any water depth relation (Hensen et al., 2000). For example, sulphate reduction by methane oxidation is most intense at locations between 2000-3000 m water depth as derived from sulphate penetration depth of about 4m, deepening up- and downslope. Generally, the pore water profiles reflect transient (non-steady state) conditions. This comprises the readjustment via diffusion of newly created pore water gradients and interactions due to different redox conditions in older and newer deposits. In two cores off the Rio de Plata mouth ascorbic acid and dithionite extractions of the solid phase reveal reactive Fe(III)-concentrations of up to 7 g/kg two meters below the sulphate penetration depth which are comparable to or even higher than those at the sediment surface. This suggests that a sediment cover of some meters has been deposited rapidly before those Fe(III)-minerals could be transformed. The result are sharp fronts between the zone of sulphide release (sulphate-methane transition zone) and the zone with available Fe(III)-minerals. These fronts are characterised by secondary iron-sulphide enrichments and intense phosphate release. Overall, pore water profiles of phosphate, barium, manganese, and iron indicate suboxic processes below the depth of sulfate penetration in a number of gravity cores from this area. At present, numerical modelling is carried out to better understand the interacting geochemical processes, to determine on which time-scales these mass transports occur and to get an idea of their significance for the organic carbon cycle.

Hensen C, Zabel M & Schulz HD, *Deep-Sea Research II*, **(in press)**.