

**Sensitivity of the CaCO<sub>3</sub> content of marine sediments to the kinetic expression of CaCO<sub>3</sub> dissolution**

**Birgit Schneider**<sup>1</sup>, Guy Munhoven<sup>2</sup>, Anke Regenberg<sup>1</sup>

<sup>1</sup> University of Kiel, Germany (bschneider@gpi.uni-kiel.de)

<sup>2</sup> Université de Liège, Belgium

The preservation of calcite in marine sediments depends on the CaCO<sub>3</sub> saturation state of the ambient pore waters and - to a lesser degree - of overlying seawater. A simple sensitivity analysis shows that the two common expressions to quantify the saturation of seawater with respect to CaCO<sub>3</sub> ( $\Delta\text{CO}_3 = [\text{CO}_3] - [\text{CO}_3]_{\text{sat}}$ ,  $\Omega = [\text{CO}_3] / [\text{CO}_3]_{\text{sat}}$ ), when used for the calculation of the time dependent rate of CaCO<sub>3</sub> dissolution either in the water column or in the sediments, yield very different rates of CaCO<sub>3</sub> dissolution. With the help of an ocean biogeochemical model it was found that different kinetic expressions for pelagic CaCO<sub>3</sub> dissolution in an ocean acidification scenario result in a wide range of surface to mid-depth calcite fluxes in the open ocean, which has strong implications for particle ballasting, the flux of calcite to the sediments and finally the global carbon cycle. In the present study we employ a marine sediment model that is fed by calcite and other biogeochemical fluxes from the ocean biogeochemical model using different realizations of calcite dissolution kinetics under (1) preindustrial and (2) last glacial maximum background climate conditions to assess the model-data agreement of the calcite content of deep sea sediments. A better understanding of the mechanisms driving calcite dissolution in the ocean is important to assess the time scale of calcite compensation, for example during glacial-interglacial cycles, but also in future greenhouse scenarios.