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Ocean-sediment interactions in an earth system climate model

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The paleoceanographic record provides a critical check on mechanisms proposed to account for the ca. 90 ppm glacial-interglacial variability in atmospheric CO_2. While decades of international ocean drilling activity has provided a great wealth of data, the down side is that the complex spatially and temporally varying nature of the measured sediment properties makes interpretation of exactly what was going on in the late Quaternary extremely hard. Numerical models of the Earth system can help us understand the data.

Here we present results from a new earth system climate model - GENIE (http://www.genie.ac.uk/), in which the modern atmosphere-ocean-sediment carbon cycle is optimized against available ocean tracer and sediment core-top property datasets. This will initially be used to explore the controls on the glacial $CaCO_3$ distribution in marine sediments and to predict changes in carbonate ion concentrations. Our goal is to determine the set of possible ocean biogeochemical and circulation changes that are consistent with the sedimentary record, thus helping to constrain the causes of glacial-interglacial changes in atmospheric CO_2.