Exploring a diagenetic overprint of Glacial-Interglacial variations in foraminiferal Nd isotopic composition

GENNA PATTON[1], ROGER FRANCOIS[1], DOMINIQUE WEIS[1]

[1] The University of British Columbia, Vancouver, Canada (gpatton@eoas.ubc.ca)

Using a simple numerical pore water model, we explore diagenetic parameters which may contribute to the glacial-interglacial Nd isotope variations of sedimentary foraminifera in the equatorial Atlantic Ocean. In our model, we assume that the authigenic phase associated with foraminifera acquires some amount of Nd from overlying seawater and then allow this authigenic phase to exchange Nd with pore water. Exchange of Nd is a function of the modelled pore water Nd concentration and concentration of Nd in the authigenic phase. The primary source of Nd to pore water is release from lithogenic components.

In the scenarios examined here, we allow the labile fraction of lithogenic material to increase as a function of relative sea level. During low sea level stands, river particles are discharged directly off the continental shelf to the deep sea with a larger fraction of labile lithogenic material, which can then be released in pore water. However, during low sea level stands, lithogenic particles are trapped in shallow estuaries on the continental shelf where they lose a larger component of their labile fraction prior to burial in the deep sea. Allowing the labile fraction of lithogenic material to vary results in changes of pore water Nd concentration between glacials and interglacials which in turn determines the extent of the diagenetic imprint of pore water Nd on the authigenic phase.

Within our diagenetic framework, we reconstruct the Nd isotopic composition of foraminifera from MIS6 to MIS1 and compare the modelled result to data. Including a diagenetic component of Nd in foraminifera allows us to reproduce the large scale features of the foraminiferal εNd record without invoking changes in seawater εNd.