Modelling neodymium isotopes using a general circulation model (FAMOUS): Exploring the role of a benthic flux in unconservative behaviour in paleo records and observations

S. M. ROBINSON [1]*, R. F. IVANOVIC [1], L. GREGOIRE [1] AND T. VAN DE FLIERDT [2]

[1]Earth & Environment, University of Leeds, LS2 9JT, UK (correspondance: ee14s2r@leeds.ac.uk)
[2]Imperial College, London, SW7 2AZ, UK

The neodymium isotopic composition (ε_{Nd}) of seawater is extensively used to reconstruct past evolution of ocean circulation. However, uncertainty in quantifying the global ocean Nd budget and the processes governing the distribution of marine ε_{Nd} hinders its application as a circulation tracer. A benthic flux of Nd has been proposed as a mechanism capable of modifying the ε_{Nd} signature of deep and bottom waters. However, a benthic flux has yet to be included in any complex numerical model scheme simulating the global distribution of Nd isotopes. This highlights an opportunity to devise and test a novel scheme that better deals with the complexity of Nd cycling in the oceans.

Here, we present the new scheme we are developing, extending previous Nd modelling efforts to constrain mechanisms and cycling of Nd in the global ocean by simulating Nd isotopes in a fast-coupled atmosphere-ocean General Circulation Model (FAMOUS). In our new model scheme, the cycling of Nd isotopes is represented by considering aeolian dust input, dissolved riverine fluxes, boundary exchange, reversible scavenging and for the first time a benthic flux. To do this, we have produced an extensive new compilation of continental margin ε_{Nd} boundary/benthic source signature derived from published Nd isotope measurements. We demonstrate the difference in marine ε_{Nd} that is simulated using the new continental margin ε_{Nd} data set (presented here) compared to the widely used compilation by Jeandel *et al.* (2007).