

Rare Earth Elements (REE) and Nd isotopes in the ocean: A review

JEANDEL CATHERINE¹

¹LEGOS (Université de Toulouse, CNRS, CNES,IRD, UPS), 14 avenue Edouard Belin, 31400, Toulouse, Fr.

Catherine.Jeandel@legos.obs-mip.fr

Rare Earth Elements are probably one of the most challenging frontiers for marine geochemistry these years. Since the pioneer works of our eminent colleagues as H. Elderfield (GB), E. Sholkovitz (USA) or Y. Nozaki (J), the development of the GEOTRACES international program improved the number of seawater REE and Nd isotope data, be it in the framework of process studies¹ or along oceanographic sections². Many recent publications suggest that sediments deposited along ocean margins are capable of releasing a fraction of their constituting elements to seawater. This hypothesis was raised by the oceanic distribution of neodymium (Nd) isotopes and concentrations, which suggest that 1 to 3% of continental sediments deposited along ocean margins are involved in this releasing process³, behaviour consistent with observations made in estuaries and suggesting a sediment and/or suspended material source for REE to the ocean⁴ and within the ocean itself⁴. Although the release of Nd and other REE could also result from the dissolution of particle coatings, the oceanic budget of Nd isotopes constraints the involvement of a detrital lithogenic end member in the release process¹. Quantifying such mechanism is a major challenge, because it likely affects other chemical element oceanic budgets and cycles (e.g nutrients as Si or Fe).

The review will make the link between the first hypotheses on the oceanic REE behaviours, our present understanding of their cycle and some tracks for future research on this fascinating family of oceanic tracers.

[1] Rousseau *et al*, Nature Com., 2015 [2] Garcia-Solsona *et al*, Geochim. Cosmoch. Acta, 2014 [3] Arsouze *et al*, Biogeochem., 2009 [4] Sholkovitz & Szymczak, E. Planet. Sci. Let. 2000 [5] Grenier *et al*, J. Geophys. Res. Ocean, 2013