Neodymium isotopic composition: which paleotracer?

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Tachikawa et al. 2017 (https://doi.org/10.1016/j.chemgeo.2017.03.018)

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Nd IC evolution along the Thermohaline Circulation



Nd IC: increasing along the THC

Van de Flierdt et al, 2016

Nd IC of seafloor Mn-Fe deposits



Goldstein and Hemming, 2003

Catherine Jeandel (CNRS)

Nd IC and δ^{13} C in formaniferas, south east Atlantic









However, let's consider the Nd concentrations

Van de Flierdt et al, 2016

Nd IC: increasing along the THC Nd concentrations ~ constant



Tachikawa et al, 2017

Model coupling OGCM and Nd cycle (all sources&sinks) (Arsouze, 2008; Arsouze et al, 2009)





•BE is **THE** major source term (>95% of the total : 1.1 10¹⁰ g(Nd)/an).

•Dust and dissolved river inputs significant in the Atlantic surface waters.

•Reversible scavenging required in order to reconciliate the Nd and ε_{Nd} with depth and along the thermohaline circulation •(*in agreement with H. Elderfield and Ed Sholkovitz earlier hypothesis*)

Continental inputs & margins: major role in the Nd oceanic cycle....



- Identify areas strongly affected by local/regional Nd inputs.
- Evaluate faithfulness of ϵ_{Nd} recorded by various archives.

<u>Approach</u>: Construction of seawater and archives (≤ 10 ka) database including T, S, O₂ and nutrients¹, ¹⁴C (GLODAP)² and δ^{13} C of DIC³ and distance from margin. Tachikawa et al, 2017

Questions raised by Tachikawa et al, 2017

- Detrital Nd influence is mainly observed within 1000 km from the continents. Why 1000 km?
- Depth profiles of seawater [Nd] and ε_{Nd} suggest the influence of external Nd sources above 1500 m. *Shallower reconstructions?*
- At water depths ≥1500 m, large-scale water mass mixing is a primary control of deep water ε_{Nd} distribution. Constraint on Nd IC as circulation tracer
- No systematic ε_{Nd} bias due to archive types. Offsets are rather related to oceanic locations. *Good new for paleos*

More details, more discussions based on Katharina's talk!

ϵ_{Nd} data compilation

