

Dissolved neodymium isotopic composition in the south western Indian Ocean (SWINGS cruise, GEOTRACES GS02)

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Neodymium isotopic composition (ϵ_{Nd}) is a powerful tool to understand past and present ocean. In the modern ocean, close to margins and seafloor, it is a proxy of boundary exchange, in other words elemental exchange at ocean/continent interfaces. Away from margins and seafloor, ϵ_{Nd} is a tracer of water mass mixing. This feature allows the use of ϵ_{Nd} in paleoceanography to reconstruct past ocean circulation. However, the modern Nd cycle is not fully constrained yet, quantified sources being too low to balance its budget.

This talk will focus on present dissolved ϵ_{Nd} along the northern part of the SWINGS transect, in the south western Indian ocean (La Réunion-South Africa-Marion Island). Sampling close to the south African margin, nearby Durban, and close to Marion Island allows investigation of boundary exchange in these areas. For the South African margin, ϵ_{Nd} distributions show limited exchange, with inputs limited to a layer at 600 m depth. The influence of the basaltic Marion island is strong below 1000 m, with a signature more radiogenic than expected from water mass distributions. Away from the margin, the striking observation is a very unradiogenic signal at 4000 m depth between 25 and 28°S east and west of Madagascar, that cannot be explained by water mass mixing only. The discussion will focus on this diversity of Nd sources (and more broadly REE) in the area, their quantification and the implications for Nd cycle in the Indian Ocean and at a global scale.