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The Mid-Miocene Equatorial Oceanic Jet in the Indian Ocean studied by high resolution Nd isotope stratigraphy

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Since 40 Ma, the plate tectonic evolution in the Indian Ocean including the opening of Tasman Strait in the South and the closures of Indonesian and the Tethysian seaways in the North played a the large role in the modification of the global ocean circulation and had probably a large impact on the global climat. We propose that a large reorganization of the oceanic circulation in the Indian Ocean occured at 13 +/- 0.5 Ma and the establishment in a westerly strong surface and intermediate oceanic current which dominated the Indian Ocean circulation from 13 Ma to 3 Ma: The Miocene Indian Ocean Equatorial Jet (MIOJet). Three sedimentary cores located in the Indian Ocean and one in the Pacific Ocean have been studied: Sites ODP 758 and ODP 757 (on the Ninetyeast Ridge), Site ODP 707 (near the Seychelles islands) and Site 807 (Ontong Java Plateau). We have measured the ϵNd of the fossil seawater variations for the past 25 Ma, using an improved technique of differential chemical dissolution. Two main features can be observed on the data. Firstly, the increasing difference between the four signals on the last 25 Ma-period. Secondly, the remarkable coherent variations between the records at Sites 757 and 707 located at opposite side of Indian Ocean from 13 Ma to 3 Ma. Three evidences favored a strong surface current. The high ϵNd obtained after 13 Ma in the Indian Ocean can be explained by the fact that the equatorial current coming from the Indonesian strait increases suddenly and/or becomes more radiogenic. Very distant sites, located on both side of Mid Indian ridge, record exactly the same ?Nd value, showing that exactly the same water-mass bathed both sites. Site 707 has always been at a very large distance from the Nd sources and radiogenic Nd has to be transported on this large distance without been dispersed.