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The climatic 14 Ma event: relationship between Himalayan and Indonesian tectonics studied by Nd and Pb isotopes in Northern Indien Ocean sedimentary cores

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During the last 40 Ma, the Indian Ocean has undergone larges changes in response to the reorganization of tectonic plates. The Australian block moved northward opening the Tasman Strait in the south, closing the Indonesian Passage, and creating multiples actives volcanic arcs in the Equatorial region. The Thethys disappeared closing the connection between the Indian Ocean and the Atlantic at low latitude. The collision of the Indian and Asian blocks yielded the rise of the Himalayan Chain and the Tibetan Plateau. At 14 Ma the onset of the Mid-Miocene cooling induced the rapid increase of the Antarctic ice sheet and large change in the global climate. [1]
The Indian Ocean circulation and its chemistry were largely affected by the modification of the connection with the other oceans. Nd isotope stratigraphy performed on carbonated sediments from the ODP Sites 707, 757 and 758 in the Equatorial Indian Ocean has shown the initiation at ≈14 Ma of a strong westerly oceanic current that durably linked the eastern and the western Indian Ocean. This current was refered as the MIOJet (Miocene Indian Ocean Equatorial Jet) [2]. We also determined the Pb isotopic composition and concentration of the past seawater over the last 40 Myr by analyzing the sediment at these three ODP Sites. The Pb isotope records show more complex patterns linked to the fact that Pb has a much shorter residence time than Nd and thus is more sensitive to local or regional inputs. By contrast with the Nd records, the influence of the Himalayan surrection is clearly observed in the Pb records over the past 30 Ma. Succesive phases of the uplift are recorded.
[1] Zachos et al., 2001, Science , 292, 686 -693
[2] Gourlan et al., 2008 Earth Planet. Sci. Lett, 267, 353-364