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A modeling study of physical and biogeochemical changes occurring in the tropical Indian Ocean during Miocene times.

Anta-Clarisse Sarr, Yannick Donnadiou, Clara Bolton, and Baptiste Suchéras-Marx

Aix Marseille Univ, CNRS, IRD, INRA, Coll France, CEREGE, Aix-en-Provence, France (sarr@cerege.fr)

The South Asian Monsoon (SAM) is one of the most important climatic features of the Asian continent. Proxy-based reconstructions from continuous records in the Indian Ocean suggest a settlement of modern-like monsoon during the Miocene, with a modern winds distribution and strength potentially reached by ~13 Ma. Concurrent with the SAM intensification, a major reorganization of surface ocean currents occurred in the Indian Ocean. The timing of monsoon strengthening overlaps with changes in Indian Ocean and Indonesian Gateway configurations, Himalayas uplift, global cooling, as well as East Antarctic Ice Sheet expansion. Thus, the respective influence of each factor on SAM evolution and Indian Ocean paleoceanography is still poorly understood owing to the modification of multiple forcing mechanisms.

Here we will use a set of experiments with the IPSL-CM5A2 Earth System Model under early to late Miocene configurations in order to tease apart the effects of paleogeography changes, ice-sheet growth and CO₂ levels on the Indian Ocean region during the Miocene. We will focus on the impact of increasing SAM winds and precipitation on the oceanographic conditions in the Indian Ocean including not only physical parameters but also biogeochemical ones.