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Sediment score shows mountain off beat with climate change

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Neodymium (Nd) isotopes recorded in marine sediments are usually used in paleoceanography as tracers of changes of past climate. The Indian Ocean raises the interest because of its connections with the Atlantic and the Pacific Oceans, and because of the proximity of the Himalayans drained by the Ganga-Brahmaputra-Meghna (GBM) rivers system. The origin of the variations of seawater Nd isotopic data observed over the last Glacial/Interglacial cycles remains unclear. They are either interpreted as changes in the global oceanic circulation or as changes in the continental input of Nd related to changes in the continental rainfalls. Here we present a simple technique to discriminate these two interpretations at a given site, based on the correlation of δ18O and εNd seawater signals. We show in-phase records at site SK129-CR2 (Arabian Sea) and out-of phase records at site ODP-758 (Bay of Bengal), suggesting that the two sites have recorded different phenomena through time. Arabian Site fluctuations were interpreted as changes of the thermohaline circulation and Bay of Bengal Site fluctuations as changes on the Himalayan input. As Himalayan rivers input is linked to the Earth's climate variability, we filtered the time series of δ18O and εNd at Site ODP 758 around the three periods related to the three main orbital parameters. We show that the time lag between δ18O and εNd increases from 1000 to 2000 and then to 7000 years for the 23 ky, 41 ky, and 100 ky filtered signals. To explain the delays between temperature changes recorded by δ18O and εNd, two models were proposed: diffusive and erosion models of Himalayans. For the first time, we demonstrate that a geochemical dataset can record and thus constrain the time lag in the erosional response of an active mountain belt to climate change.