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The Owen Ridge uplift in the Arabian Sea: implications for the sedimentary record of Indian monsoon in Late Miocene

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The pelagic cover of the Owen Ridge in the Arabian Sea recorded the evolution of the Indian monsoon since the Middle Miocene. The uplift of the Owen Ridge resulted from tectonic processes along the unidentified fossil Miocene India-Arabia plate boundary. Based on seismic reflection data tied with deep-sea drillings to track the Miocene India-Arabia plate boundary, we propose a new timing for the uplift of the Owen Ridge and highlight its impact on the record of climate changes in pelagic sediments. The new dataset reveals a fracture zone east of the Owen Ridge corresponding to the fossil plate boundary, and documents that the main uplift of the Owen Ridge occurred close to ∼8.5 Ma, and is coeval with a major uplift of the east Oman margin. Late Miocene deformation at the India-Arabia plate boundary is also coeval with the onset of intra-plate deformation in the Central Indian Ocean, suggesting a kinematic change of India and surrounding plates in the Late Miocene. The uplift of the Owen Ridge above the lysocline at ∼8.5 Ma accounts for a better preservation of Globigerina bulloides in the pelagic cover, previously misinterpreted as the result of a monsoon intensification event.