



Kinematic signature of India/Australia plates break-up

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The paradigm of Plate Tectonics states that the uppermost layer of the Earth is made of a number of quasi-rigid blocks moving at different rates in different directions, while most of the deformation is focused along their boundaries. Perhaps one of the most interesting and intriguing processes in Plate Tectonics is the generation of new plate boundaries. The principle of inertia implies that any such event would invariably trigger changes in plate motions, because the budget of mantle basal-drag and plate-boundary forces would be repartitioned. A recent episode is thought to have occurred in the Indian Ocean, where a variety of evidences – including localized seismicity along the Ninety East Ridge, compression-generated unconformities of ocean-floor sediments, and identified paleomagnetic isochrones – suggest the genesis of a boundary separating the India and Australia plates. Here we use global numerical models of the coupled mantle/lithosphere system to show for the first time that an event of separation between India and Australia, having occurred sometime between 11 and 8 Myrs ago, has left a distinct signature in the observed record of plate motions. Specifically, while motions of India and Australia relative to fixed Eurasia are almost indistinguishable prior to 11 Myrs ago, their convergence to Eurasia since then differs significantly, by as much as 2 cm/yr. Finally, we speculate about possible causes for the separation between India and Australia plates.