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Global Plate Circuits at Paleocene-Eocene time

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A dramatic change in the opening of the Northeast Atlantic ocean observed around chron 21o (47.9 Ma) seems to have been triggered by changes in both absolute and relative plate motions (Gaina et al., 2009). In the Indian ocean, rigorous plate circuit analysis has also shown a large but gradual slowdown on the Central Indian Ridge and SE Indian Ridge starting shortly after chron 23o (51.9 Ma) that continued until chron 21y (45.3 Ma) (Cande et al., 2010). Changes in early Cenozoic spreading directions between the Pacific and adjacent tectonic plates were recorded by numerous fracture zone in the Pacific ocean, and the "bend" in the Emperor-Hawaiian hotspot track that developed in the early to mid-Eocene (Sharp and Clague, 2006) shows a change in either the Pacific absolute plate motion, changes in mantle convection, or the plume conduit. In the same time, a study of global plate motions and distribution for the last 150 Ma has shown that Early Cenozoic global lithospheric net rotation experienced a dramatic increase around 60 Ma followed by a sudden decrease at 50 Ma, pointing to a serious decoupling between mantle and lithosphere (Torsvik et al., 2010).

This study explores the link between regional changes in the Indo-Atlantic and Pacific realms at Paleocene-Eocene time by revising the fracture zone and magnetic anomaly identifications in key areas, re-assessing global plate circuits and plate polygons for shorter intervals, and assessing different hotspot reference frames. This detailed global model will be the basis for improved geodynamic models that can test whether a dramatic decoupling between lithosphere and mantle could have triggered profound changes of our planet from the core to the atmosphere.