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Testing models for the origin of the Paraná-Etendeka Igneous Province

The Paraná-Etendeka igneous province and associated magmatism, including the Walvis Ridge, the Tristan da Cunha archipelago, and the Rio Grande Rise, has been variously attributed to passive response to intraplate extension or to a deep-mantle plume postulated to currently underlie the island of Tristan da Cunha. The volcanic region is one of only three in the world where a Large Igneous Province is associated with subsequent time-progressive volcanism. Multi-disciplinary methods have been applied to test the various hypotheses for its genesis. These include study of the vertical crustal motions precursory to flood volcanism, the spatial distribution and time-history of volcanism, the synchronous deformation and volcanism in the adjacent African and South American plates, the fabric of the sea floor, the seismic structure of the mantle, and the geochemical composition of the lavas. Models inspired by the huge array of observational data available have been further explored using numerical modeling of mantle convection. In this paper I shall review data and models that bear on the formation of the Paraná-Etendeka igneous province, and discuss ways to extend and test them.