



The Deccan-Reunion hotspot history: hotspot-ridge interaction for the last 60 Ma

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The history of the Deccan-Reunion hotspot is often described as the smooth and continuous building of the Deccan traps, Laccadives, Maldives, Chagos, Nazareth, Cargados Carajos, and Soudan Banks, and finally Mauritius and Reunion Islands, as the Indian and African plates were moving northward. The Deccan-Reunion hotspot is therefore envisioned as a typical intraplate hotspot during most of its history, except when the Central Indian Ridge (CIR) crossed the hotspot track at about 35 Ma - without much consequence on both of them.

Conversely, the geochemical enrichment, peculiar morphology and geophysics of the CIR at 19°S support some kind of recent hotspot-ridge interaction. Ar-Ar dating of dredged samples from Rodrigues Ridge, a 600-km long volcanic structure, suggests a rapid emplacement of this ridge at 7-11 Ma, whereas Sr, Nd and Pb isotopes show gradual fading of the Reunion hotspot influence with distance. Signs of a more recent activity are Rodrigues Island, dated about 1 Ma, and a set of recently discovered en-echelon volcanic ridges, Three Magi and Gasitao Ridges, which extend Rodrigues Ridge up to the CIR axis. These sigmoid ridges, aligned along an E-W direction, provided K-Ar ages of 0.4 and 1.8 Ma, and their isotopic compositions are intermediate between those of Rodrigues Ridge and the CIR axis.

The observation of such an interaction while the CIR and Reunion Island are 1000 km away from each other suggests that the Deccan-Reunion hotspot had a long history of interaction with the Carlsberg Ridge (CR) and the CIR in previous stages of its history. This interaction started as early as the hotspot inception by the Indian plate, triggering rifting between India and the Seychelles Block and the opening of the CR between A29r and A27 (65-61 Ma). The geometrical configuration of the CR-CIR

and the hotspot suggests that, between A26 and A20 (58-43 Ma), the CR was close to the hotspot. At a large scale, the observation of systematic ridge propagation in the Arabian and Eastern Somali Basin between A26 and A21r has been interpreted as reflecting interaction between the CR and the Deccan-Reunion hotspot. Conversely, interaction with the CIR was limited due to the long offset of the Mauritius-Chagos FZ. A significant part of Chagos, Nazareth, and Cargados Carajos Banks may have been formed on the African plate, as a conjugate of Maldives and southern Laccadives Banks, in agreement with their physiography and the ages provided by drilling sites. Once reconstructed, the conjugate tracks are symmetrical; they narrow and deepen with younger age, suggesting a decrease in the hotspot strength. The saddle between Maldives and Chagos Banks, located at a bend in the general trend of the structure, would correspond to a fossil ridge dated ~A20 (43 Ma). The good fit between Chagos Bank and the Mascarene Plateau suggests rifting and break up of pre-existing structures between 43 and 35 Ma, instead of a mid-ocean ridge passing over a hotspot.

The hotspot would have been quiescent between 45-10 Ma, possibly inhibited by the thick northeastern Mascarene plateau created in earlier stages of its evolution. The cause for its rejuvenation in two pulses at 11-7 Ma (Mauritius Island, Soudan Bank, and Rodrigues Ridge) and the last 2 Ma (Reunion and Rodrigues Island, Three Magi and Gasitao Ridges) is unclear and may be related to internal deformations of the African plate.

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