



## **Rifting and magmatism at the western margin of India**

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The Deccan Traps igneous province in western India has been interpreted as resulting from a Réunion mantle plume and its interaction with the continental rifting that led to breakup between India and the Seychelles microcontinent. We conducted a wide-angle seismic experiment extending from thinned Indian continental crust in the north, across the intervening deep basement of Gop Rift/Laxmi Basin and shallow basement of Laxmi Ridge, and onto oceanic crust to the south. The resulting data suggest that Laxmi Ridge is underlain by continental crust, and that both Laxmi Ridge and the thinned continental crust to the north are underlain by thick (5-10 km) wedges of material with velocities of 7.0-7.5 km/s, interpreted as underplated magmatic rocks. However, such underplating is largely absent in the Gop Rift; it is also absent seaward of Laxmi Ridge, where seaward-dipping reflectors interpreted as lava flows are imaged in seismic reflection data. Published geochronological data indicate that the Deccan Traps were erupted at 65.4±0.7 Ma during Chron 29n, while the oldest clearly identified and complete seafloor spreading anomaly in the Arabian Basin is 27n (61.5-62.0 Ma). Hence the first oceanic crust was probably formed during Chron 27r (62-63 Ma), 1.7-4.1 My after the eruption of the Deccan Traps. Most authors agree that Gop Rift formed either before or coevally with Seychelles-Laxmi Ridge breakup; later opening would be difficult to reconcile with Indian Ocean magnetic anomaly patterns. Linear magnetic anomalies are present in the Gop Rift, but are difficult to associate with particular isochrons; recent interpretations suggest that they formed by fan-shaped rifting either at Chron 31 (69 Ma) or between Chrons 29 and 27 (faster in the SE than in the NW). We infer that rifting in the Gop Rift occurred during the Deccan event (although may have started earlier) and was therefore accompanied by extensive magmatism. However, Seychelles-Laxmi Ridge separation occurred after the main Deccan event and perhaps during a time of plume quiescence or beyond the influence of the plume.