

Continental flood basalt magmatism contemporaneous with Deccan traps in the Mannar basin, offshore Sri Lanka

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Abstract

The Gulf of Mannar and adjoining Cauvery basin to the north between India and Sri Lanka are associated with a failed rift, which initiated during the late Jurassic to early Cretaceous as a precursor to the breakup of East Gondwana. Despite the occurrence of igneous rocks that can be noted in seismic profiles, offshore, and deep seated occurrence of those have lead only to the limited understanding of igneous activity in the Mannar basin. Rock cuttings recovered in the Barracuda exploratory well in the Mannar basin shows approximately 700 m thick basalt rock sequence interlayered with sediments at a depth of 3500–4200 m below mean sea level. Here, we analyzed samples recovered from the Barracuda well for major and trace element composition. Major and trace element data suggest that the basalts were crystallized from two different degrees of partial melts from a similar source. Chondrite normalized rare earth element (REE) patterns indicate that the basalts are similar to continental flood basalt, though they show a distinct Ba positive anomaly. Importantly, supported with previously available K–Ar data, we decipher that these basalts are contemporaneous with the Deccan traps. Rifting between Seychelles and India which had occurred at ~62 Ma approximately 3.5 Ma after the main Deccan eruption is synchronous with the Barracuda volcanism suggesting coeval rifting between Seychelles–India and India–Sri Lanka. Thus, our data suggest simultaneous rifting between Seychelles–India and India–Sri Lanka. Large plate reorganizations that took place during this time period in the Indian Ocean have likely caused consequent passive rifting in the Mannar basin.

KEYWORDS

Barracuda, continental flood basalts, Deccan, Mannar basin, Pearl-1