Evidence of extension at the southwest continental margin of India and opening of the Laccadive Basin: Constraints from geophysical data

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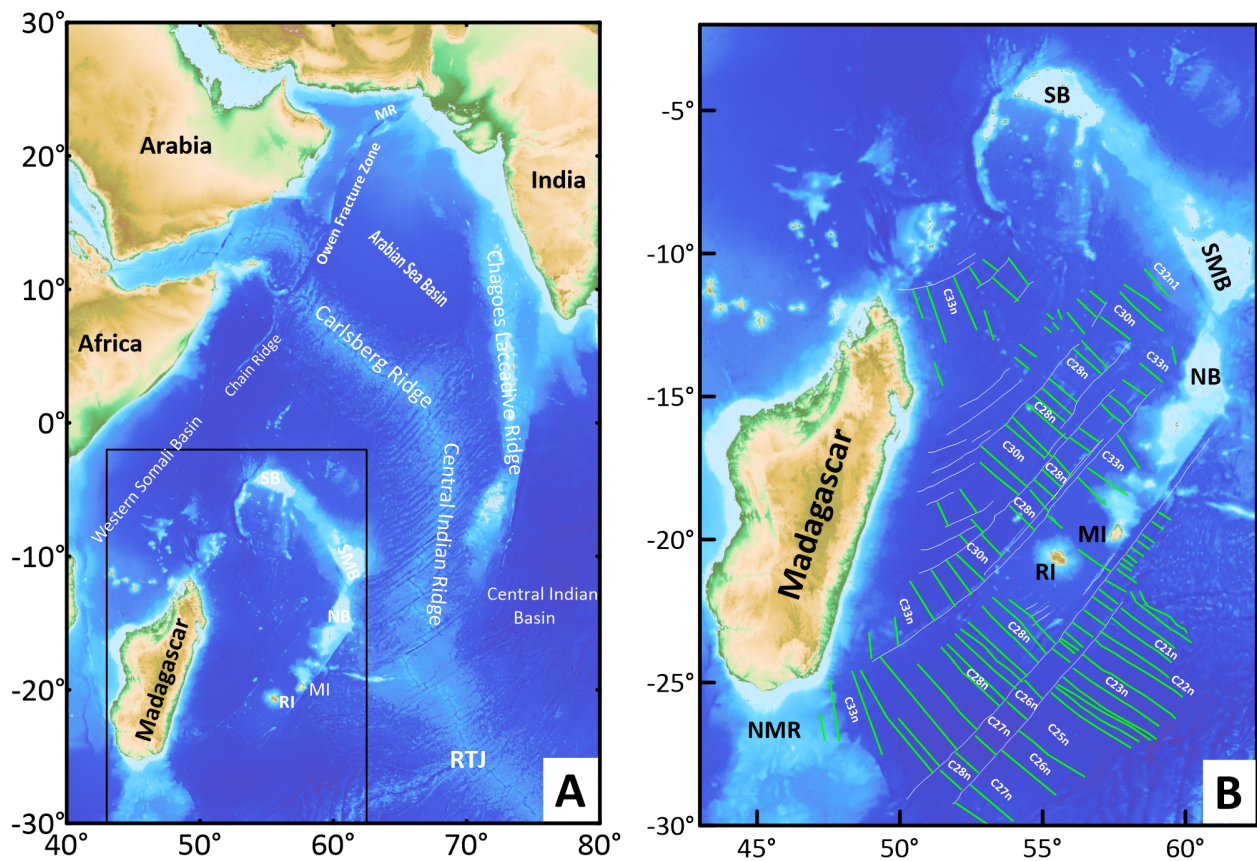
Figure S1: A) Regional tectonic map of the northwestern Indian Ocean with satellite-derived seafloor topography (Smith & Sandwell, 1997). The area shown in the black rectangle is shown in figure B. B) Tectonic map of Madagascar and Mascarene basin showing mapped seafloor spreading type magnetic lineations in solid green coloured lines (Bhattacharya and Yatheesh

2015 and references therein). Solid white lines represent the mapped fracture zones or pseudo-faults. SB: Seychelles Bank; SMB: Saya-de Malha Bank; NB: Nazarat Bank; MI; Mauritius Island; RI: Reunion Island; RTJ: Rodrigues Triple Junction; NMR: Northern Madagascar Ridge; MR: Murray Ridge
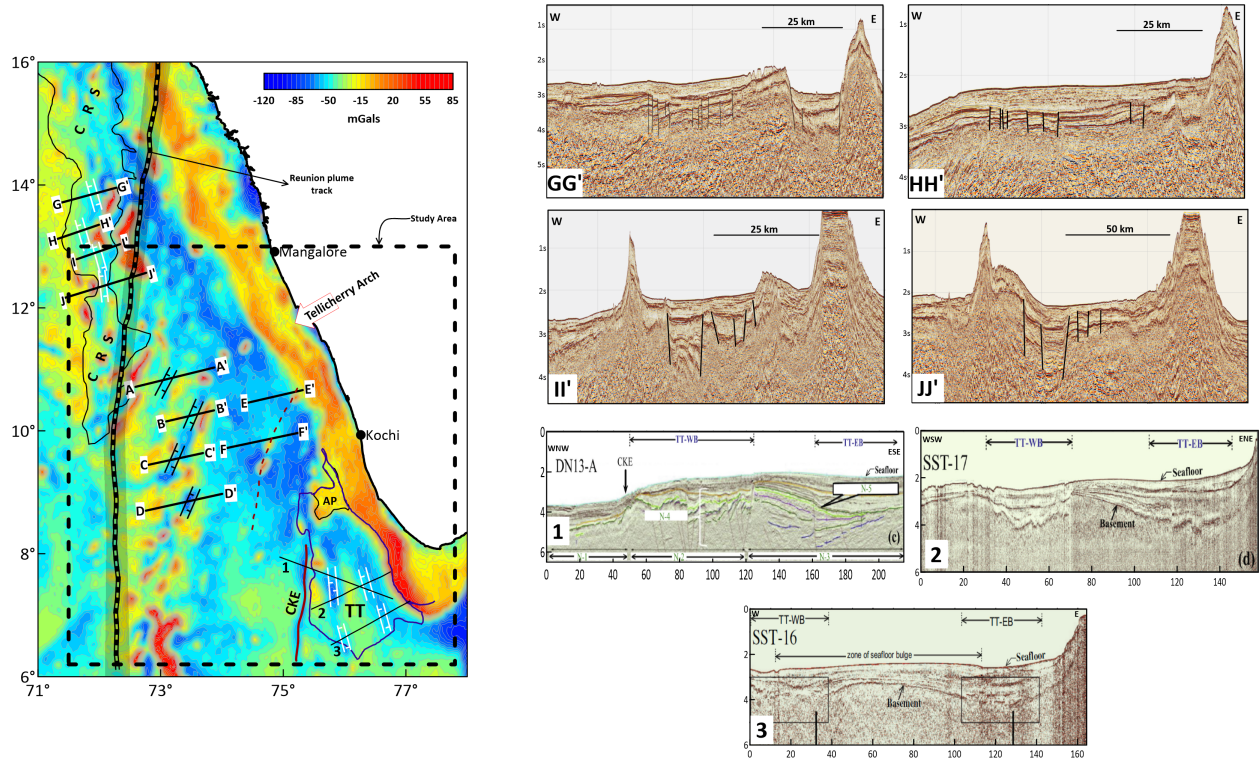
Figure S2: Satellite-derived free-air anomaly map of the study area showing the location of identified extensional features/grabens and intrusives. Black solid lines represent the location of the profiles. Interpreted seismic sections are shown on the right. The faults are marked. The location of seismic sections is marked in the free-air anomaly diagram. (refer to Unnikrishnan et al., 2023 and Unnikrishnan 2018 for full seismic sections). Seismic sections 1, 2 and 3 compiled from Yatheesh et al 2013 and Nathaniel 2013). The broken brown line in the centre of the basin represents the identified volcanic ridge. CKE: Chain-Kairali Escarpment; AP: Alleppey Platform; TT: Trivandrum Terrace

References:

Bhattacharya, G. and Yatheesh, V.: Plate-tectonic evolution of the deep ocean basins adjoining the western continental margin of India—a proposed model for the early opening scenario, Petroleum geosciences: Indian contexts, pp. 1–61, 2015.

Smith, W. H. and Sandwell, D. T.: Global sea floor topography from satellite altimetry and ship depth soundings, Science, 277, 1956–1962, 1997.

Nathaniel, D.: Hydrocarbon potential of sub-basalt Mesozoics of deepwater Kerala Basin, India, in: 10th Biennial International Conference & Exposition Kochi, pp. 1–7, 2013.

Unnikrishnan, P.: Crustal structure, tectonic and sedimentation history along the Kerala-Konkan basin, western continental margin of India based on integrated geophysical studies: Ph.D. thesis, IIT Bombay, Mumbai, India, 2018.

Unnikrishnan, P., Gilbert, M., and Radhakrishna, M.: Crustal structure along the Kerala-Konkan Basin, southwest continental margin of India, using multi-channel seismic and gravity modelling: Implications on India-Madagascar rifting and basin evolution, Journal of Asian Earth Sciences, 242, 105 504, 2023.

Yatheesh, V., Kurian, P. J., Bhattacharya, G., and Rajan, S.: Morphotectonic architecture of an India–Madagascar breakup related anomalous submarine terrace complex on the southwest continental margin of India, Marine and Petroleum geology, 46, 304–318, 2013.