

# Review of the paper (egusphere-2023-1757)

<b>Authors</b>	Gilbert M. George, P. Unnikrishnan, M. Radhakrishna
<b>Title</b>	Evidence of extension at the southwest continental margin of India and opening of the Laccadive Basin

## OVERALL ASSESSMENT

The paper deals with a detailed understanding of the southwestern continental margin of India and its adjoining offshore regions based on the rift structures inferred in the Laccadive Plateau region and a curvilinear volcanic trend inferred from the Laccadive Basin, mainly by using the long-offset multichannel seismic reflection profiles. For this, the authors used eight deep-penetrated multichannel seismic reflection sections over the Laccadive Plateau, three seismic section over the Alleppey-Trivandrum Terrace Complex, and two seismic sections over the Laccadive Plateau. The authors derived inferences based on the interpretation of the basement features in terms of rift structures and volcanic intrusives, and evaluated these results with the computed crustal Bouguer anomalies and depth to the basement map.

The results of the present study are based on adequate data and the inferences made by the authors over the Laccadive Plateau and the Alleppey-Trivandrum Terrace Complex are well demonstrated by observations depicted from the seismic sections, complemented by the gravity signatures. All the inferences made by the authors on the opening of the Laccadive Basin based on the isochron map and sedimentation history also appears to be acceptable, however, their structural interpretation on presence of a volcanic intrusive features with a curvilinear trend appears to be too weak to be accepted since this inference is put forward only based on two seismic sections, and such signatures are not clearly visible either in the crustal Bouguer anomaly map, or in the depth to the basement map.

The interpretations provided for the Laccadive Plateau and the Terrace off Trivandrum are quite reasonable, and overall, the paper is well written. The paper falls very well within the standard of the papers published in the EGU journals. My specific comments are given below for the improvement of the paper. I recommend to accept the paper, after incorporating the minor / moderate revisions effecting the following comments provided.

## SPECIFIC COMMENTS

- 1) In the whole text: “Reunion” may be corrected as “Réunion” in throughout the manuscript.
- 2) Lines 10-12: Please modify the sentence in view of the
- 3) Line 9: “pre-rift” may be modified as “pre-drift” since the age information cannot be derived from magnetic anomalies observed from rift stage crust, but possible only when these magnetic anomalies are formed by seafloor spreading (i.e., drifting”). Therefore, magnetic anomalies can provide only “pre-drift” juxtaposition.
- 4) Lines 9-10: The detailed mapping of seafloor spreading magnetic anomalies in the conjugate Arabian and eastern Somali basins (spreading between India-Laxmi Ridge block and Seychelles) was published by Chaubey et al. (2002, Geological Society, London, Special Publication 195, pp. 71-85). The same may be quoted here. Although you mentioned geochronology here, the references are missing, please add the same.

- 5) Figure Caption 1: “MR: Murray Ridge” may be deleted since you have not used this abbreviation in the figure, it is written in expanded form in the figure.
- 6) Lines 2123: You mentioned “..... *whereas, more recent studies (Torsvik et al. (2013); Bhattacharya Yatheesh (2015) incorporate....*”. This sentence is misleading since Bhattacharya and Chaubey (2015) has not included Mauritius in their model. So, this sentence may be modified as “.....*whereas, more recent studies incorporate continental fragments like Laccadive Ridge (Bhattacharya and Yatheesh, 2015) or Mauritia, consisting of Mauritius, Southern Mascarene Plateau, Laccadive Plateau and Chagos Bank (Torsvik et al. (2013) between India and Madagascar in the India-Madagascar pre-drift scenario*”.
- 7) Line 37: “complicity” may be corrected as “complexity”.
- 8) Line 39: The sentence “..... Laccadive Basin area will shed light on the margin’s evolution ....” May be modified as ““..... Laccadive Basin area will provide important constraints on the margin’s evolution ....”.
- 9) Lines 79-83: It is mentioned that “*Further, a curvilinear trend of volcanic intrusive features is identified in the Centre of the Laccadive Basin parallel to the identified extensional trend. This trend is also observed in the gravity anomaly map as a broken chain of highs*”. This inference does not appear to be convincing. First of all, you have only two seismic sections in which intrusives are mapped, therefore, with these two profiles, we can neither interpret the continuity of the features nor its arcuate trend. In addition, I am unable to identify any clear and convincing curvilinear trend from any of the maps presented in Figure 3”. Your other interpretations on the ENE-WSW and NW-SE extension on the Laccadive Plateau are convincing as it is clearly observed from the seismic sections. Bringing the inference of Laccadive Basin trend actually dilute the quality of the paper. Therefore, this inference appears to be too weak to be accepted. Hence, I suggest removing this inference on the Laccadive Basin and these sentences. Abstract and conclusions also may be modified accordingly.
- 10) Line 88: “.... Either side of the identified volcanic ridge”. Please read this in view of my comment 9.
- 11) Lines 124-128: “*The trend of the intrusives and bathymetric highs in the study area follows the identified extensional trends....., we noticed a series of volcanic mounds with a trend almost parallel to the CKE..... The observed trend correlates well with the crustal Bouguer anomaly map as well as the trap depth map*”. The inference on trend of the intrusives in the Laccadive Basin derived only using two seismic section appears to be weak. Further, the bathymetric highs (consisting of seamounts, plateaus, knolls, hills, and guyots), most of which are interpreted to be associated with volcanism, are distributed randomly in different parts of the Laccadive Basin (please see Bijesh et al., 2018), but do not show any characteristic and systematic trend. Other than one trend representing CKE, any other such trends are not clearly visible from the crustal Bouguer anomaly map as well as the trap depth map provided in Figure 3. Therefore, this inference on the Laccadive Basin appears to be weak.
- 12) Line 152: “..... titled intrusive” or “tilted intrusive”? Please check.
- 13) Lines 17, 198, 225, and 227: The author’s name “Bhattacharya, G.” may be corrected as Bhattacharya, G.C.”
- 14) Line 181: “GEBCO, C.G.”. Please check, what is “C.G.”?