General Comments:

- Introduction assumes the reader knows the area well (see comments reviewer 2). In order to allow readers with limited knowledge on the area to understand what is being described, it would be needed to provide some context at the start, rather than directly describing the tectonic history of the area.
- Names of tectonic features etc. need to be explained and shown on maps.

- The manuscript is short, which is nice overall, but often it is a bit too short and thus unclear (see comments)

- All figures are too small and need various adjustments (see specific comments)

- The supplement contains only 3 figures, and they are cited various times, which makes reading the manuscript a bit inconvenient. It may be better to simply add (the key parts of) these figures to the manuscript (perhaps even merged with the current manuscript figures, see also comments on figures).

- There seems to be some mixing of results and discussion. The results should present the raw observations, whereas interpretations and discussion should be provided in the discussion section.

- The order of the discussion chapter needs some adjustment.

- Timing of geological events is a big issue in this manuscript. There seems to be some circumstantial information that can help explain things, but there seems to be a lack of reliable data from the area itself (the only reliable data available seems to be the age of the sediments in the Laccadive Basin, but that does not allow us to interpret much beyond the development of the basin). As such, the interpretations and the proposed model seem rather speculative. It would be good to have additional information from wells and seismic interpretation (see comments below).

Reply:

We thank the editor for going through the manuscript in detail and providing many useful suggestions and comments. We have incorporated all the suggestions made by the editor, which greatly improved the readability and quality of the MS. The suggestions regarding the use of scientific color scale and the references to numerical/analog modelling studies were greatly useful.

We have added more details and figures to the introduction section describing the present-day setting and defining important features like the Laccadive Ridge, Laccadive Basin, the Mascarene Basin, Tellicherry Arch etc. The manuscript (MS) is elaborated by adding more material to the introduction and discussion sections. In addition to this, the discussion section is rearranged and elaborated. Similarly, all the figures are enlarged and more figures are added to the MS and supplementary section. We have tried to explain the evolution of the basin as clearly as possible. The detailed reply to comments line by line is given below:

Abstract

Comment: Line 1: "two-phase" may be better than "double"
Reply: We thank the editor for the comment. The suggestion is included.

Comment: Line 3: perhaps use "with the Seychelles separating from India"
Reply: We incorporated this suggestion.

Comment: Line 4: "is not discussed" seems to suggest that the topic is not discussed in this manuscript. How about "remains poorly constrained" or something similar?
Reply: We thank the editor for the comment. We now changed the sentence.

Comment: Line 6: it is not clear what the Mascarene Basin is, this should be fixed (see also Comments of editor 2 regarding the general accessibility of the text to people who are not familiar with the region's geology).
Comment: Line 7: Laccadive Ridge and Tellicherry Arch have the same issue as in Line 6
Reply: The description about the present-day setting and regional geology (especially Mascarene Basin, Laccadive Ridge, Tellicherry Arch) is now included in the revised MS.

Comment: Line 8: it should be "towards the south" I believe
Reply: We agree. We made necessary change.

Comment: Line 8: "Plate reconstruction models" → these are your new models right? So use "Our new plate reconstruction models" or perhaps "our plate reconstruction modelling" to make this very clear. (now it reads like someone else did this work). Otherwise, use "previous plate reconstruction models" or so.
Reply: We meant to say previous plate reconstruction models. The MS is revised accordingly.

Comment: Line 10: "Paleocene traps" or "a Paleocene trap"
Reply: It is Paleocene trap. The MS is revised accordingly.

Comment: Line 11: "has been attributed" suggests this is someone else's idea, not something new in this paper. It should probably be "we attribute" or so
Reply: The sentence is rephrased for clarity.

Introduction

Comment: In general, the introduction starts with the geological history of the area, without introducing the general (present-day) setting. This is confusing, it would be much better to have a (quick) overview of the general features of the area, before diving into the tectonic history head-first. Also, some additional maps are needed to make this part work (see also Comments on Fig. 1).

- See also comments by reviewer 2 on the accessibility of the text for those who are not that familiar with the regional geology (of SW India).

Comment: Line 16-17: here, the text should directly refer to Fig. 1 I would say (to illustrate the geology). In fact, it seems that Fig. 1 is not at all mentioned in the introduction? You should make sure to help the reader understand the geological context as much as possible, including ample references to figures.

Reply: We thank the editor for the above comments. A brief description about the present-day setting of the northwestern Indian ocean is now included in the MS. Moreover, two figures, one showing the general setting of the northwestern Indian Ocean and Gondwanaland in late Paleozoic fit and the other showing detailed tectonic map of the western continental margin of India and the Mascarene Basin is now added to the introduction. Care has been taken to introduce and define Laccadive Ridge, Laccadive Basin and Tellicherry Arch in the introduction itself.

Comment: Line 18: consider using "this second break-up" for clarity
Reply: The MS is revised accordingly.

Comment: Line 19: I believe it should be "fairly well established"?
Reply: Agree. The MS is revised accordingly.

Comment: Line 23: it should probably be "the Southern Mascarene Plateau, the Laccadive Plateau, and the Chagos Bank"
Reply: We agree. The MS is revised accordingly.

Comment: Line 23: the Chagos Bank is not indicated on any map it seems? Same for Mascarene Plateau?
Reply: Figure 1A now shows Chagos bank (CB). Saya-del-Malha and Nazareth Bank together is the Mascarene plateau (fig. 1A & 2B).

Comment: Line 25: "is" should be "are" I believe (or use "represent"?)
Reply: The MS is modified to correct this.

Comment: Line 28: "wide-spread trap layers"
Reply: The MS is revised accordingly.

Comment: Line 29-31: this sentence seems a bit out of place (it seems to describe the methods used in this manuscript). Can it be removed or rephrased a bit? → or include it in the last part of the introduction, where it would be good to quickly mention the methods used in this manuscript.
Reply: We agree with the editor. We have removed this part for clarity.

Comment: Line 33: "long-time" → remove the hyphen?
Reply: The MS is revised accordingly.

Comment: Line 33: "m.y.r." should probably be "Myr"
Reply: All through the MS, we prefer to give as Ma. The MS is revised accordingly.

Comment: Line 35-39: these sentences /motivation for this study seems a bit random to me. It is not that clear what is meant here, as these are rather different issues that are not clearly related to each other (sediment ages vs. the overall complex geodynamic setting). It should be rephrased a bit. Some detailed Comments:

- How would the absence of sediments fit with opening of the basin at 83 Ma (India-Madagascar break-up)? If anything, I would then expect that sediments are present, which is not the case?
- And well CH-1-1 does in fact cross into older units? The sentence seems to suggest that the other wells were simply not deep enough to reach the relevant sedimentary layers?
- It seems to be strange to me that it would be a surprise to have older sediments below the Paleocene traps. Is it not to be expected that there would be older units/sediments below the traps?

Reply: we thank the editor for the questions. With regard to the questions above, there are some details to be considered, firstly C-H-1-1 well lies on the continental shelf close to the coast at shallow water depth (250 m Approx.). Secondly in the **Laccadive Basin** Mesozoic sediments are not encountered until now. But the plate-tectonic reconstruction studies based on magnetic anomaly identifications and volcanism show that separation of India and Madagascar started around 83 Ma. It is a possibility that there can be presence of Mesozoic sediments below the trap layer. Another alternative scenario is that the Laccadive Basin opened up later as implied by data in this study, in which case the probability of finding older sediments maybe limited to pockets along the shelf which opened up during the India-Madagascar separation.

Line 36-39: this is a rather long sentence that seems to have some grammar issues, please double-check.

- "new complexity" seems off (the complexity itself is not new, it's just that we don't/did not yet understand it I would say?) → "makes for a complex geodynamic setting" or so may work better here
- "inheritance … before" seems off, how about "into the pre-existing lithospheric inheritance"?

Reply: We thank the editor for the comment. The changes are made accordingly.

Comment: Line 36: "India-Madagascar separation"
Reply: The changes are made accordingly.

Comment: Line 39: use "the development of the Laccadive Basin" or something similar. The current wording seems to suggest there is a sedimentary formation called the "Laccadive Basin formation"
Reply: The changes are made accordingly.

Comment: Line 39-40: the same thing is stated in Line 42-44. I suggest removing it here to avoid duplication.
Reply: The changes are made as per the suggestion of the editor.

Comment: Line 40: what kind of "evidence"? → see previous comment on mentioning the methods used in this manuscript. That way the reader can better appreciate where things are going.
Reply: The sentence is rephrased for clarity and better understanding.

Comment: Line 42: "Understanding" seems a bit vague → what exactly needs to be understood?
Comment: Line 43: "will provide" suggests this needs to be done in the future, but the start of the sentence seems to suggest it is already known. Please make very clear which of the two it is

(e.g., use “future studying and time-stamping” or “event provides important constraints”, respectively).

Comment: Line 44: use “plate tectonic reconstruction studies” to make it clear what is reconstructed.

Reply: We thank the editor for pointing out these. The sentence is reframed as per the suggestion of the editor.

Description of tectonic elements

Comment: Line 45: add “of the study area” to make it clear we are not talking about the region as a whole.

- NB: several terms are used in this manuscript (“study area”, “area under investigation”, “area of interest”). I suggest choosing one and using it consistently throughout the manuscript.

Reply: We thank the editor for pointing out this. The changes are made as per the suggestion of the editor. We have now used study area throughout the MS.

Comment: Again, make sure to refer to Fig. 1 early on

Comment: See comments on Fig. 1 on the need for more maps

Reply: We included few additional in the introduction to better explain the present-day setting and tectonic history.

Comment: Line 46-47: as it is written, it is not fully clear whether only the southern part of the Laccadive Basin is included → consider swapping the place of the ridge and the basin in this sentence. Also “in the offshore” seems incomplete?

Reply: The Laccadive ridge extends further north upto around 16^0 N. We mean to say that the study area (Laccadive Basin) lies between the southern part of the Ridge (south of Tellicherry Arch) and the continental shelf of India. The part in the offshore is redundant and we have deleted it. Hence it is mentioned *“southern part of the Laccadive ridge and the Laccadive Basin”*.

Comment: Line 49-50: the CKE is not indicated in Fig. 1 it seems? Please add all structures/locations mentioned in the text to relevant figures.

Reply: We thank the editor for pointing out this. The figures are now modified and all the relevant features mentioned in the MS are now included.

Comment: Line 50-51: this is the first clear definition of the Laccadive Basin, 50 lines into the text. As this basin is in the title, it should be introduced very early on (in the first couple of lines).

- Ah, I now see that there is also a definition in line 25. Still, please consider the previous comments on “setting the stage” in the first sentences of the text.

Reply: We have modified the introduction to explain the present-day setting.

Comment: It seems that the CRS is not mentioned, even though it’s a very important feature (for instance, it’s the first topic of the discussion)? Please add some description here to prepare the reader.

Reply: We thank the editor for pointing out this. The CRS is identified by Director General of Hydrocarbons, a body under the government of India. They used 2D and 3D seismic data to identify the features but the details of the seismic sections are not available in the public domain.

The identified extensional features north of Tellicherry Arch falls within CRS and the identification by DGH stops abruptly with a sharp cut where a different extensional event was identified in this study. Hence, we believe that the extensional features north of Tellicherry Arch forms the CRS and towards the south of it represent a different tectonic event. The link to DGH report is given in the MS and is accessible to the public.

Data and Methods

Comment: Line 55-59: somehow the text is not that clear here: it is stated twice that seismic lines are used, apparently for the same purpose (?).
Reply: The first mention of the seismic lines refers to the section which are presented in this paper. The second mention is the vast amount of seismic data which is used to derive the sediment thickness map of the basin. This is industry data, the details of the lines used to create the sediment thickness map are given in figure S3. (after Unnikrishnan et al., 2023)

Comment: Line 56: why not use the more recent 2023 GEBCO bathymetry data?
Reply: We thank the editor for pointing out this. Major portion of the work was done last year and hence the old dataset. We compared the two datasets in the study area and they seem to be matching well except some isolated areas but it can be seen that this does not affect the conclusions from the study.

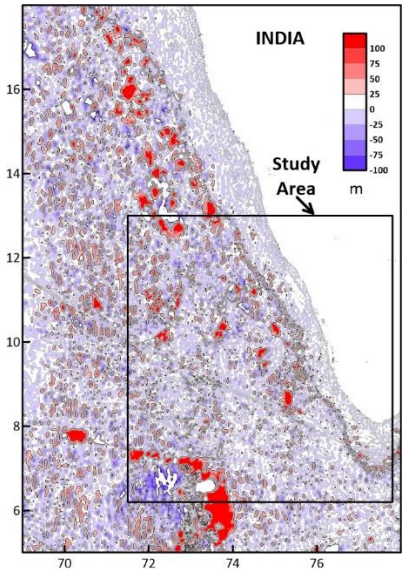

Figure: Comparison between GEBCO2020 and GEBCO2023 version of bathymetry data

Comment: Line 56: "the long-offset" → I believe that "the" should be deleted there. This goes for a number of places in the text, where "the" seems to indicate a very specific thing that is not really specified before in the text, and therefore seems a bit off. I hope this makes sense.
Reply: We thank the editor for the comments. We have made changes accordingly.

Comment: Line 57: "provided" is a bit unclear, it seems to suggest that these data were simply taken from Unnikrishnan et al. 2023). These data cover the whole study area? It may be good to show the extent of the different datasets (in the supplement would be ok).

Reply: Yes. The data refers is the vast amount of data which is used to derive the sediment thickness map of the basin. This is industry data, the details of the lines used to create the sediment thickness map is given in Unnikrishnan et al., 2023. The diagram showing the areal extend of data and the seismic lines used for the preparation of the TWT maps is now included in the supplementary file S3.

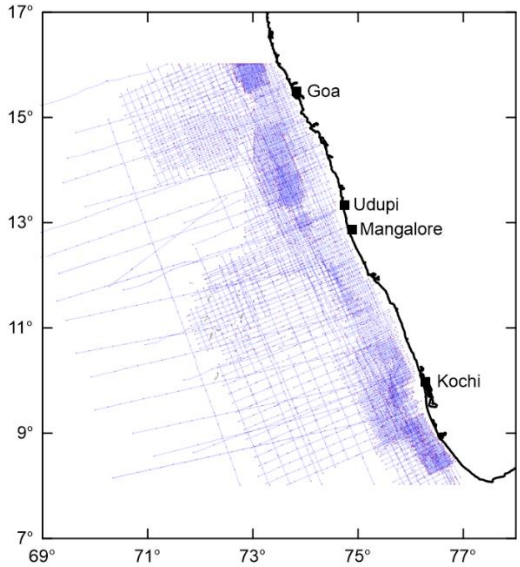

Figure: The seismic profiles used to prepare the Two-way time (TWT) maps. (Reproduced from Unnikrishnan et al., 2023)

Comment: Line 58: what are "intermediate" horizons? Please clarify in the text. (e.g. "and various horizons within the post-Paleocene sediments").
Reply: The intermediate horizons refer to the early Paleocene, early Eocene, early Miocene respectively. This is mentioned in the second paragraph of the section data and methods.

Comment: Line 58: what is meant by "compiled"? Did you produce these sections yourself, or did you interpret them? Please rephrase to clarify.
Reply: We thank the editor for asking this. We gathered interpreted seismic sections in the study area to support our observations and synthesis. We have not interpreted the data but have taken the interpretations given in those papers. The interpretations given by these earlier studies support our model presented.

Comment: Line 62-63: a citation would be in order at the end of this sentence, or at the end of the previous one.

- Line 62: I suggest using "these two-way travel time (TWT) maps
- Note that TWT should be defined in line 61, as that is the first occurrence of the abbreviation.

Reply: We thank the editor for pointing out this. The changes are made as per the suggestion of the editor.

Comment: Line 65: add ", respectively" after "column".
Reply: The changes are made as per the suggestion of the editor.

Comment: Line 68: only one seismic section, or multiple?
Reply: The changes are made as per the suggestion of the editor.

Comment: Line 68: what is meant with "transferred"? you mean "identified on the gravity anomaly maps" I assume? Please rephrase.
Reply: We thank the editor for pointing out this. By 'transfered' we mean that, the location of the features identified were transferred to the gravity anomaly maps and their continuity were mapped.

Comment: Line 84-85: the coast-parallel grabens are not shown? It may be better to just state that sedimentation is high along the coast.
Reply: We thank the editor for pointing out this. The changes are made as per the suggestion of the editor.

Results

Comment: Line 72-74: why are these extension directions interpreted as such? It seems that these en echelon graben arrangements may in fact indicate oblique kinematics, rather than orthogonal stretching. For example, the NNW-SSE oriented grabens could indicate ca. NNE-SSW extension. As such, you should be very careful with these statements here. In fact, this all goes into interpretation/discussion domain, and should be addresses in the discussion. The results are the place where the "clean" observations are presented.
Reply: We thank the editor for pointing out this and the suggestion of references to analog and numerical modelling studies were greatly helpful. We agree to the comment that the first rifting event greatly influences the grabens developed during a later event. We have shifted the interpretation part to the next section incorporating the suggestions by the editor.

Comment: Line 77: how parallel to the extensional trend (or trends?) is this volcanic intrusive really? That is, what is the orientation of the extensional trend (not clearly defined)? Is it one "intrusive" or can we speak of a series of intrusive structures/bodies? Please rephrase where needed.
Reply: It is not a single intrusive but a series of intrusives and the extensional trend is the NNE-SSW trend identified south of Tellicherry Arch. The sentence is reframed for clarity.

Comment: Line 81-82: please annotate this channel in the figure, it's not that clear what is meant
Reply: The channel is now annotated in the figure. We mean to say that the sediment channel may represent the very initial stage of opening of the Laccadive Basin.

Comment: Line 83: the sedimentation is significant in the northern part of the Laccadive Basin, not overall. Please rephrase the text to better reflect this.
Reply: The changes are made as per the suggestion of the editor.

Discussion

Comment: Line 88: I would use "Discussion"
Reply: This is corrected in the MS.

Comment: Line 89: see previous comment what is the CRS? This needs to be clearly defined early on in the manuscript, as it seems to be very important
Reply: As mentioned earlier, this is now clarified in the MS in the discussion part (see also reply to earlier comment).

Comment: Line 90-91: similar to the introduction, the reader is expected to remember everything about the local (and regional) geology, and we directly dive into the geological history, rather than starting with the data and their implications to gradually build up to a regional picture. As a whole, section 5.1 seems out of place here→ the discussion needs some reconstruction as to provide a logical story to present to the reader.
Reply: We thank the editor for pointing out this. After going through the MS in the light of the comments, we understood this drawback. Now we have improved the discussion section first by start interpreting the results then going to regional picture. Some sections are merged with the first part of discussion and some rearrangement is also carried out (Please refer to paragraph one of discussion)

Comment: Line 90-91: how do these data show that the development of the Laccadive Ridge occurred after, and not during, India-Madagascar break-up?
Comment: Line 91: what mainland is meant? India or Madagascar? Please indicate
Comment: Line 91: how do we know it is passive extension? This needs to be explained
Reply: We thank the editor for the above questions and comment. We agree that the data presented do not indicate the development of the Laccadive Ridge after India-Madagascar breakup. It is highly probable that this happened during India-Madagascar separation as the study area in an extensional regime during that time (also evidenced by the presence of Mesozoic sediments in CH-1-1 well). Similarly, there is no data to state it is a passive extension. So, we have reframed the sentence to correct these mistakes and bring more clarity.

Comment: Line 91-93: see previous comment on the interpretation of the extension directions as interpreted in this manuscript. Note also, that according to this interpretation, the southern part of the Laccadive basin would have seen yet another extension direction, given the orientation of the grabens. This is all too simplistic and needs more careful consideration.

- Could it be that these basins are in fact of different age? See previous comment on the lack of interpreted horizons in the sections.

Reply: We thank the editor for the above comment. We have not carried out interpretation of seismic horizons in the study hence we cannot comment on that. The discussion on this matter is now included in the MS.

Comment: Line 94: see comments on the use of/references to supplement data in the main text: this seems important data that should not be hidden in the supplement.
Reply: As mentioned earlier more figures are now included in the MS and some additional figures in the supplementary material.

Comment: Line 96-97: how do we know the age of the CRS?
Reply: We do not know the age of CRS. From the orientation of the extensional features on CRS and the spreading direction recorded in the magnetic anomalies in the Mascarene Basin it can be safely seen that they can be correlated. Moreover, this is also parallel to Dharwar trend which is a

prominent structural trend onshore. So, it is considered in this study that CRS formed during India-Madagascar separation.

Comment: Line 97-100: how is the CRS defined? There are extensional structures further south, could these not simply be part of the CRS? Having some age constraints from seismic data could help here.

- Regarding the different orientation of the grabens: an explanation could be that there was some inherited structural grain that got reactivated, forcing the development of these grabens in a different orientation than that what one would expect.

Reply: Here we consider the change in orientation to represent a different extensional event. This conclusion is made because of two major reasons. 1) the entire area has a common evolutionary history but the trend north and south of Tellicherry Arch is markedly different. 2)There is no prominent NNE-SSW trend in the onshore region to explain the extensional features south of Tellicherry Arch whereas the extensional features in the north of the Arch follows the dominant Dharwar trend. More discussion about these aspects are now included in the discussion part

Comment: Line 104: why suddenly use Mangalure and not the Tellicherry Arch as an indication here? (and why refer to Fig. 1, which is not relevant here?)
Reply: We thank the editor for pointing out this. This is now corrected in the MS. (Please refer to figure S2 in the revised MS)

Comment: Line 110-112: there is no beta-factor analysis provided? Please add this.
Reply: As this is now included in the MS.

Comment: Line 119-120: It is not clear what the median high is, and how it indicates opening of the basin after the Eocene (as the text seems to suggest now).
Reply: The median high refers to the chain of volcanic intrusive identified along the centre of the basin. It is seen in the sediment deposition map (from Early Eocene to Early Miocene) that the sediments are deposited on either side of this feature. This indicate that the feature was present during this time (intrusives already got emplaced forming a high). The high lies along the centre of the Basin and deposition is seen on either side of the feature. Hence, we infer that the basin opened after Early Eocene.

Comment: Line 120: I would state "after the early Eocene" as it is not excluded that significant sedimentation (and thus basin development) initiated in the mid- or late Eocene.
Reply: We agree with the editor and changes are made in the MS.

Comment: Line 122-123: would not the initial "patch" indicate the start of basin development?
Reply: Yes. The initial patch can indicate the start of the basin development. We thank the editor for this comment. This is now added in the discussion part.

Comment: Line 126: what is meant with "by this time"? there is no clear or logical indication in the previous sentences to use this wording, please specify
Reply: The sentence was unnecessary and is removed.

Comment: Line 126-128: it is not clear to me what information in this study justifies the correlation with the proposition of Unnikrishnan et al. (2018) that the Alleppy Platform was

formed during the Oligocene-Miocene. (what is meant by "formed"?) There is not seismic section provided that covers this platform, and I believe it is not even really addressed in the results? Please clarify in the text what is meant.
Reply: Unnikrishnan et al. (2018) identified the Alleppey platform as a continental fragment and inferred its development during the Oligocene-Miocene period. Alleppey platform is located adjacent to the Laccadive Basin and hence the development of the basin and the platform is related. The timing of the development of the Alleppey platform given by Unnikrishnan et al. (2018) closely agrees with the inferred timing of the opening of the Laccadive Basin from this study. This is now clarified in the MS.

Comment: Line 130: see previous comments on names of geological units/structures. Nowhere it is clear what the Mascarene Basin is.
Reply: As mentioned earlier this is now included in the MS (figure 1A and 2B).

Comment: Line 130-145: the evolution proposed in this section seems nice, but also highly speculative as very little clear evidence is presented (either from the analysis in this paper, or from previous works). Various tectonic and geodynamic events are mentioned, which are not properly set up in the introduction. This all needs some work to make it more convincing. Note also that most references are rather old, I assume there must be some newer works with the latest insights that could be used here.
Reply: The section is expanded adding more details to it for clarity. We have included all the relevant recent studies in the MS.

Comment: Line 130: in fact, it is not merely "near" but directly adjacent to the Mascarene Basin I believe? (the Mascarene Basin being the basin developing between India and Madagascar, if I understand it correctly)
Reply: We agree with the editor. This is now corrected in the MS.
Comment: Line 134-140: see previous comments on the orientation of the grabens in the study area. It may be interesting to have a look at analogue and numerical modelling works that test the impact of inheritance during rifting. You can for instance have a look at the works by Henza et al., Molnar et al., Bonini et al., and Zwaan et al.
Reply: We thank the editor for this suggestion and the references. We have incorporated inputs from the studies in the paper. This was very helpful and added to the paper.

Comment: Line 143-144: This seems a bit of a bold statement: what is the evidence for this? It should probably be toned down a bit.
Reply: The sentence is reframed as per the suggestion.

Comment: Line 145: is there any description of the age of the volcanics vs. the sediments in the basin? This would be an important observation from seismic sections to be included in the results (which it is not at the moment)
Reply: Unfortunately, there are no ages of volcanics available from the study area. In seismic section presented in fig. 4 it can be seen as sediments onlapping on the intrusive features. This indicates that the sediments are younger compared to the volcanic intrusion.

Conclusion

Comment: Line 154: it should at least be specified what plume is meant here.

Reply: The change is made as per the suggestion of the editor.

Figure 1

Comment: This figure is much too small (especially the tectonic reconstruction), and the text is really not readable in large parts of both panels. Note also the varying font sizes → I strongly recommend standardizing font sizes.
Comment: It would be much better to include a general map (panel A from Fig. S1) to help the reader understand the various tectonic elements that are mentioned in the text, but not shown (e.g., Madagascar, Seychelles). Furthermore, it would be good to have a zoom-in map of the study area as well, to clearly show the tectonic elements described in section (2) of the text.
Comment: Note that although the Laccadive Basin is in the title of the manuscript, there is no obvious indication of where it is situated. Instead, the left panel shows in large bold letters the Laccadive Ridge and Maldives.
Reply: We thank the editor for pointing out these. As replied earlier, additional figures are given in the introduction (refer to figure 1 and figure 2). Figure 1 now shows the configuration of northwestern Indian Ocean and the location of the study area in Gondwanaland in late Paleozoic fit. This gives a regional picture. Figure 2 shows the study area (that is the Laccadive Ridge, the Laccadive Basin and adjoining areas) and the Mascarene Basin in detail. In addition to this, the figures are made bigger. Laccadive Basin is now very clearly shown in figure 2B.

Comment: There is no ocean depth/topography scale it seems? Please add. (also, in the supplement)
Reply: This is now added in the figures.

Comment: The left panel indicates the Laxmi Ridge (and SVP + DVP) as polygons, whereas elements such as the Laccadive Ridge and Maldives are not. This seems inconsistent. It would in fact be much better to show a simplified geological map (the general map from Fig. S1 could serve as a general introduction instead). One thing that should probably be added: the Continent-Ocean transition, unless the Laccadive Basin is a (hyperextended) rift basin (this is not very clear)
Reply: We thank the editor for pointing out this. Earlier the Laxmi Ridge and SVP was given as polygons since they are not very clearly visible in the bathymetry map and the boundaries are identified from free-air anomaly and seismic studies respectively and the boundary of DVP from geological mapping. Whereas the Laccadive Ridge and the Maldives ridge is identified by bathymetry. The figure from S1 is now added to the MS in figure 1. A detailed tectonic map of the study area is given in figure 2A. The continent-ocean boundary (COB) is marked towards the west of Laccadive Ridge as COB since most of the studies indicate that the LR is underlain by hyperextended continental crust (Murty et al., 1999; Gireesh and Pandey 2014; Unnikrishnan et al., 2023).

Comment: In the right panel, the area of interest is indicated with a red rectangle. This rectangle is however poorly visible (at least to me, I got slight red-green colorblindness). I would suggest using a black outline for the AOI, and using less thick greyish outlines for the continents. Similarly, the thick continental outlines drown out the break-up information.
Reply: We thank the editor for pointing out this. The figure is enlarged and modified accordingly.

Comment: There are white and green lines used in the left panel. These are not very clearly distinguishable. Perhaps making the map larger would help, but also consider
Reply: We thank the editor for pointing out this. The map is enlarged for clarity and the limits are decreased to better show the features discussed in the section "Tectonics of the study Area".

Comment: What is the definition of the Vengurla and Tellicherry Archs? I believe this is not really specified anywhere? Please clarify in the text.
Reply: Using the huge volume of industry seismic data, ONGC has identified several Basement Arches orthogonal to the coast and the WCMI into several offshore sub-basins. Vengurla Arch and Tellicherry Arch are basement highs identified in earlier studies which is suggested to have implications on basin segmentation (Biswas 1989).

Figure 2

Comment: Also, this figure is too small (including the text/annotation) and should be presented much larger. It may also be possible to rearrange the panels to allow for things to be made larger (i.e., move some of the sections below the map?)
Reply: We thank the editor for the suggestion. The figure (figure 4) is enlarged and a crustal Bouguer anomaly map of the area is added for showing the continuity of features north and south of Tellicherry Arch.

Comment: The color scale used in the map is a rainbow scale, which should be avoided (see the work by Fabio Crameri on the use of color in scientific publications). Moreover, the scale has no clear zero value color: a scale that has both positive and negative values should have a clear zero value color to avoid artifacts and apparent structures.
Reply: We thank the editor for the comment. Scientific color scale is now used for all figures in the MS.

Comment: I see in this figure that there is an additional zoom-in to the study area. This becomes rather confusing, as there are now two zoom-ins (study areas?) of the general area shown in Fig. 1. It would be good to only use one extent to present the model results for consistency. It is now rather difficult to for instance compare the structures shown in Fig. 2 with those shown in Fig. 3 → are the lows in fact tracing the interpreted grabens? It

- Also, there should be an indication in the caption that the location of this map is shown in Fig. 1.

Reply: The figures are now modified and two study area problem is now resolved.

Comment: The sections miss an indication that the seconds are in TWT. At the least, this should be indicated in the caption (including a definition of TWT).
Reply: This is now added in the figure and corrected in the text.

Comment: Using circles to indicate circles is a bit confusing→ one may mistake it for a zoom-in. It would probably better to just use an arrow, or perhaps a dotted circle instead.
Reply: This is now represented in the figure as dotted circles.

Comment: The white arrow indicating the Tellicherry Arch is poorly visible. Consider using another color. (same for other figures)

Reply: This is now changed in the figure.

Comment: Caption: what does "CRS represents the Cannanore Rift System as identified by DGH" mean? What is "DGH" an abbreviation of? Please specify.
Reply: DGH stands for Directorate General of Hydrocarbons. The CRS is identified by DGH, a body under the government of India. They used seismic data to identify the features but the details of the seismic sections are not available in the public domain. This is now described in the text (See discussion part and reference to the report by DGH for more details).

Comment: Note that the "broken brown line" is very poorly visible in the map. Please improve this.

- Note that the line is in fact not broken (?)

Reply: The broken line is now boldfaced for better visibility.

Comment: The horizontal scale of BB' and CC' is different from those in the other sections (which appear to also represent variable lengths in map view. It may look esthetically pleasing to have these sections in the figure all at the same size, but it does not properly represent the natural situation and the relations between these sections. Please rescale things.

- This is also relevant to Fig. S2

Comment: Seismic line labeling: why are some of these lines labels with numbers, and other with letters? Please standardize things.
Reply: The horizontal scale is now rescaled and all the seismic lines are now labelled with alphabets (please see figure 4).

Comment: Overall, only faults are interpreted in these seismic sections. Is there no data whatsoever about ages etc.? There is a mention of various boreholes in the area, so I would think this could be added? → like is done for sections 1-3 in the supplement.

- Note that there is various annotation in sections 1-3 that is not explained anywhere (no legend)

Reply: The sections present in 1-3 (now shown in S1) is from different study and not this study. Unfortunately, no age data is available from the wells.

Comment: Wy are the grabens in the Trivandrum Terrace area indicated in white? They are barely visible. Please use the same color as used to the west.

- Same for the NW corner of the map

Reply: This was done to distinguish the grabens with different orientation but since it is not visible we have changed made similar to the other grabens marked.

Comment: Upon closer inspection of the seismic sections: it seems that there are many faults that were not interpreted. Why not? In fact, I realized that the Laccadive Basin is the study area, but there is not one section that clearly shows the general characteristics of the basin (it is a rifted basin right?) → I would suggest having a look at (the figures of) Gireesh & Pandey (2014) → Open Access link: www.researchgate.net/publication/260213497
Reply: We have now included a seismic section from Unnikrishnan, 2018 to show the general characteristic of the Laccadive Basin and adjoining area. The focus of the study is to understand

the opening of the Laccadive Basin and hence we have not undertaken a detailed seismic interpretation in the area.

Figure 3

Comment: Panel (E) is described as a tectonic map in the caption, which it is not really? (panel F seems to be?)

- Note that panel F is not a map of beta-values, as described in the caption
- Overall, panels (E) and (F) seem to represent general interpretations, rather than results, and should as such be made into separate discussion figures.

Reply: There was a mistake in the labelling of diagram which is now corrected. The tectonic map, the beta-value map and the depth to basement map are now included as a separate diagram in the MS (fig.7 in the revised MS).

Comment: See comments on the use of scientific color (scales) in Fig. 2. These are also relevant here; the color scales in Fig. 3 seem inappropriate.

- Color scale units are not always aligned in the same way (compare panel A with the other panels.

Reply: Scientific color scale is now used in figures.

Comment: The lows are indicated using red lines. These lines are poorly visible: please use another indication (e.g., black dotted lines).

- The same for the CKE in green.

Reply: The changes are made in the figure accordingly.

Comment: Caption: the abbreviations of TA and TT are nor provided, please add these.
Reply: This is now explained in the caption.

Comment: Caption: the repeated "with all identifications" is a bit vague. Consider using "with all identified/interpreted structures"
Reply: We thank the editor for the above comments and the caption is modified accordingly.

Comment: In panels B-F, but not in A, there are additional lines in the SE. What do these represent (it is not clear what "shelfal tectonic elements" are, and why there are not indicated in panel A)?
Reply: The thin black lines close to the coast represent major faults identified on the continental shelf (Singh and Lal, 1993).

Figure 4

Comment: Somehow the study area has a different extent than that in Fig. 3? Please standardize the study area extent in your maps for consistency.
Reply: The extent of the area is now standardized for consistency and easy comparison between different maps. The sediment thickness map is only available from 8^0 N, hence the area below it is blanked.

Comment: See previous comments on the use of colors. This needs to be improved here.

- It would be best to use the same scale for panels A-C, to allow for easy comparison between the different time intervals

Reply: Using the same scale actually makes it difficult to appreciate the map since the sediment deposition in 6B is not comparable with the other time intervals. But we have used scientific color scale for the maps now and same color scale for panels A and C which are comparable.

Comment: I suggest using a broken line or something less dominant to indicate the sediment patch in panels A and B.

Reply: The figure is modified accordingly.

Figure 5

Comment: This figure needs to be larger to better show the details

Reply: The figure is enlarged to better show the details.

Comment: Stage III covers no less than 40 Myr, but seems to show a snapshot of the initial Laccadive Basin opening (around 60 Myr?). I strongly suggest avoiding having such time ranges in these panels, as it is confusing.

Reply: We agree with the editor and the time ranges are removed since it creates confusion and we don't have very strong control on the age range of the events.

Comment: Stage IV: I would simply remove Madagascar to avoid confusion. The way it is now shown, it seems to suggest India and Madagascar are pretty close to each other, with the black line representing a mid-oceanic ridge.

Reply: We agree with the editor and Madagascar is removed from the figure to avoid confusion.

Comment: It would be useful to add some annotation highlighting the important events in the system.

- Note the timing of the various events: how do we know the age of the rifting that is attributed to stage II? This is not really specified/justified in the text?
- See also the comment on the last part of the discussion: it would be good to

Reply: We thank the editor for the above comments. As mentioned in an earlier reply, the extension south of Tellicherry Arch do not correlate with any major structural trends on the onshore region. Further, as mentioned in the text, the Laccadive area was adjacent to the spreading centre in the Mascarene Basin and studies propose (Shuhail et al., 2018) the spreading in the Mascarene Basin was connected to CKE through long transform faults. This prompted us to suggest this timing for the formation of rift system. Later on, due to extension these rifts widened to open the Laccadive Basin.

Comment: I suggest moving the text "Stage-I" etc. in each panel to the bottom-right corner (it seems poorly aligned at the moment.

- Also, the header of the Stage-I panel seems not properly aligned

Reply: We thank the editor for the above comment and the changes are made accordingly.

Comment: Caption: please provide the meaning of ATTC and CKE (each abbreviation in a caption/figure needs to be explained in the caption [of that figure]).

Reply: We thank the editor for the above comment and the changes are made accordingly.