

Interactive comment on “Seismic gaps and intraplate seismicity around Rodrigues Ridge (Indian Ocean) from time-domain array analysis” by Manvendra Singh and Georg Rümpker

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We would like to thank the reviewers for the time spent on the review and for the helpful comments and constructive suggestions. We discuss below the comments made by referee #2.

General comments

Referee 2: The authors use a temporary array on Rodrigues Island to detect and locate (mostly) intraplate earthquakes west of the Central Indian Ridge. This is an entirely new study, which makes the most out of a small array of seismic stations. The analysis

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is sound; the approach of using beam forming to estimate azimuth and S-P times to estimate distance is sensible.

Authors Reply: We are thankful for the appreciation of our work.

Specific comments

Referee 2: It is not clear that these locations provide much new information about seismic gap 2, given the absence of detection of events from the adjacent Egeria FZ. The lack of small events could be attributed instead to poor propagation of Pn and Sn along the path to the array. There is no need for the direct effects of melt on attenuation along the paths; the attenuation is more likely attributable to the presence of thin lithosphere associated with the flow of hotter mantle to the spreading center from the hotspot.

Authors Reply: We do not really see this comment in opposition to our conclusions. However, as it is assumed that Pn propagates in the uppermost section of the mantle, a thinned lithosphere, alone, may not have such a significant effect (i.e. attenuation) on the propagation. We, therefore, concluded that partial melting also plays a role. We further agree that this is caused by hotter mantle material between the hotspot and the spreading center.

Referee 2: Lines 176-179 appear to be out of place, since they refer to “the event”, which is not introduced until lines 186-187.

Authors Reply: We thank the referee for pointing out this shortcoming. The paragraph will be shifted after line 192.

Referee 2: Also lines 186-191 suggest that array analysis of this example event is shown in figure 7, but that aspect of the event is not illustrated.

Authors Reply: A new figure will be provided in the revised version and subsequently the figures will be renumbered in the text as well as the list.

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Referee 2: Since Figure 9 largely duplicates information shown in Figures 8 and 11, this figure could be used to show regions of uncertainty around each of the locations calculated from uncertainty in azimuth and scatter in S-P picks.

Authors Reply: We tried to do this, however, plotting of uncertainties in locations will make the figure unreadable as most of the events occur in clusters. To overcome this, all uncertainties are provided in Table S1 of the supporting information. However, we decided to combine the information provided in Figs. 8, 9 and 11 in the revised version.

Referee 2: P picks appear to be pretty clear, but S picks somewhat subjective. Are S picks on each seismogram made independently, or is there iteration between different picks for each event?

Authors Reply: All S picks were made independently and are based on visual inspection of horizontal components as well as vertical where necessary.

Referee 2: Cluster 4 is not shown in Figure 10, although it is mentioned in the caption.

Authors Reply: Thanks for pointing this out. The figure caption will be modified accordingly.

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2020-56/se-2020-56-AC4-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-56>, 2020.

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