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

RESPONSE TO THE INTERACTIVE COMMENT OF REFEREE #1

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 #1. The comments of the referee are in black and the replies from Authors are provided in blue to facilitate the reading.

General comments

Referee 1: The manuscript presents a thorough array-based analysis of seismicity surrounding Rodrigues Island in the Indian Ocean. Due to its remote location and proximity to the Rodrigues Triple junction, this data set offers interesting insights into intra-plate seismicity of an oceanic plate. The authors exploit the array geometry to estimate locations of 63 events that were not detected by global networks. They suggest a simple, but adequate way of estimating epicentral distance and use backazimuths derived from array analysis. The method is very clearly documented and well-illustrated. The results suggest some well-defined clusters of intra-plate seismicity, that are clearly located away from any of the surrounding ridges. In addition, the authors discuss gaps in the seismicity distribution along the Central Indian Ridge, that are not closed by their additional data. While all results are clearly described, the interpretation is somewhat short and could easily be enhanced by some more information.

Authors Reply: We are thankful for the appreciation of our work and for pointing out the shortcomings. Based on the specific comments provided below we will enhance the discussion section of our manuscript.

Specific comments

Referee 1: To expand the discussion of the seismicity, the authors could, for example, include in their interpretative Fig. 11 the age of the oceanic lithosphere to discuss whether age differences and hence differing thermal contraction could be responsible for the intraplate seismicity. Clusters 2 and 3 seem to be located in prolongation of transform zones, so this could support this interpretation.

Authors Reply: We agree that thermal contraction could play a role in the occurrence of these clusters. This was only partially addressed in the discussion (lines 225 and 226) and we intend to discuss this in more detail in the revised version of the manuscript.

Referee 1: Fig. 11 could include a colour or symbol coding to distinguish between earthquakes in the global catalogue that were detected and those that were not detected.

Authors Reply: The required information was provided in Fig. 8. Yellow and orange symbols are used to discriminate between events from the global catalogue that were detected (and located) by the array and those that were not. Fig. 11 already contains much information related to the interpretation of the results. To keep the maps readable, repeated information were avoided in Fig. 11. However, we decided to combine the information provided in Figs. 8 and 9 in the revised version.

Referee 1: A seismic stripe-and-gap pattern in teleseismic and hydroacoustic data have for example been discussed in more detail by Escartin et al. (2008) and by Simao et al. (2010). They see a relative lack of earthquakes near magmatic centres of spreading segments, whereas segment ends at the Mid-Atlantic Ridge tend to show increased seismicity rates. This observation could provide support for the interpretation of gap 2. A regional seismicity analysis with data just south of the survey area (25 S) is presented by Tsang-Hin-Sun et al. (2016). These authors also find seismic gaps that are even somewhat clearer delineated since they use a hydroacoustic data set with lower detection thresholds. This study could therefore provide additional evidence for the existence of the seismic gaps in the present study area.

Authors Reply: We appreciate pointing out the shortcomings of our discussion. The above mentioned references provide important additional information and support for our study and will be included as part of our discussion in the revised manuscript.

Referee 1: Fig. 11 uses 18 years of data from the USGS catalogue. The reviewed ISC bulletin shows many more events in this area for the period 1970-2017.

Authors Reply: The additional data from ISC bulletin will be added to the figure.

Referee 1: It would be interesting to see whether the seismicity of cluster 4 is swarm-like and occurs in a short time period.

Authors Reply: The seismicity of cluster 4 is not swarm-like; the events occur intermittently over a period of 13 months. The details of cluster 4 have been added to Table S2 of the supporting information.