Revision of: *Picking first arrivals in hydroacoustic seismograms from MERMAID floats*, by Nolet et al.

Editor comments

I would also suggest working on some of the figures for clarity. For example, the stations names in figures 3 and 4 are very small. This is also the case in Figure 6 and the signals are difficult do distinguish. I also agree with reviewer A that the six histograms should be represented in Figure 8.

DONE (see below)

Reviewer A:

The study is timely because the MERMAID data gathered between 2018 and 2023 has reached a sufficient amount to allow such analysis. The paper is clear and informative, the investigation is sound. The words are well chosen and the text particularly short. Nothing is superfluous. Inversely, the manuscript would benefit in providing more details and explanations about the processing and analysis of the results. Readers of Seismica who are not familiar with already published work by the authors may sometimes be lost here. It would probably broaden the audience to lengthen the manuscript. An additional figure might illustrate better experiment 2. Overall, the results appear reliable but need minor clarifications and additions, therefore I suggest to return the manuscript to author for minor revisions.

We responded positively to the suggestions made in the detailed comments, see below.

Detailed comments:

I find the chapter titles “Experiment 1” and “Experiment 2” not very instructive. I would suggest titles such as “Picking by analysists” and “Insights for tomographic analysis”

DONE

Line 71 : The text says “the 403 earthquakes shown in Figure 2 “ but the figure caption mentions 1147 + 703 = 1850 events. Where does the number of 403 come from?

I don’t know! My best guess is that guess ‘403’ was entered inadvertently as line number when editing the file with vi, and was missed since it just looks so OK. Thanks to the reviewer for spotting it… We removed it.

Figure 4: I understand that MERMAID hydrophone waveforms are labeled with numbered while land seismograms are labeled with 4 letters. What is the meaning of the colors green blue and red?

Figure 4 is now 2 columns wide to make the station names more visible, as is Figure 3. The colours have no meaning but make overlapping traces better visible, which is now mentioned in the legend.

Figure 5: There is a question mark (?) is the caption, which is probably unwanted.

Reference to Simon et al., 2020, is now correct.

Figure 6: there are now more than 3 colors. I tried to find a relationship between the green, blue, red of Figure 4 and those of Figure 6 but did not manage.

As in Figure 4. In the legend we now mention that the main idea is to show the pattern of polarities in relation to the Mermaid coverage.

Line 92-93: It could be modified to “To help identify the P-arrival in the presence of noise, the arrival time predicted by the radially stratified velocity model AK135 (“P")…”

DONE

Line 103: The sentence “The last three columns…” should be moved to the caption of table 1.

DONE

Table 1: You could add the geographical area for each the cluster name, for example “Cluster D-Caribbean”.

DONE, but in Table 2, which has more place when printed in one column.

Line 104: It could be modified to “from MERMAID hydrophones (NMH), and those from surface stations’ seismometers (NGSN). “

DONE

Line 110: “For the three deep clusters A,B and C, MERMAID residuals are in an acceptable range.” Refer to Table 2 here.

DONE

Figure 8: It would be useful to show the 6 histograms instead of only 3 here.

DONE

Line 120: This sentence should be rephrased for clarity “The failure of the events in clusters D and E to come up with a distribution that is close to Gaussian shows that these shallow event picks are dominated by outliers.”

We rephrased this sentence: The histograms of MERMAID picks for shallow clusters D and E show a distribution that is clearly not Gaussian, and dominated by many delays in excess of the RSDR shown in Table 2.

Figure 9 appears too early in the submitted text and should be placed later in the final manuscript.

DONE

Line 150 : It could be modified to “… the most densely packed cluster of shallow earthquakes, cluster F.”

It cannot — the events were not limited to those in cluster F from experiment 1, and mentioning F would be misleading.

Lines 175-177 state “Since source corrections require a decent azimuthal coverage of the observations, we supplement our picks with a selection of data from the ISC catalog and NEIC.” I am confused about the data used to carry out experiment 2. I understand that land data are added for better azimuthal coverage but is it a different approach from the one in experiment 1? Are those additional data recorded by nearby island stations only or not?

This is different. As the reviewer certainly understands, the results in Experiment 1 do not depend on errors in source locations, but misfits in Experiment 2 are. We had to add ISC/NEIC stations because the coverage by GSN island stations is insufficient for the smaller magnitude events. We now clarify this in the text.

I am wondering if a new figure could illustrate better experiment 2.

We intentionally do not wish to present any `tomographic images'. A real tomographic study would need to emphasize different aspects of the inversion, add more data, do resolution tests, etcetera. Our experiment is only meant to be a preliminary study for a large-scale global inversion (which we intend to submit soon, also to Seismica, by the way).

The estimated proxies for δV_p^{loc} and the δV_p^{max} are compared to expected values. Could you provide published values from tomographic inversions?

DONE, we now compare with model UU-P07 (Hall and Spakman, 2015), which has dVp range from -9.5% in Hokkaido to +9.9% in Tonga.

Lines 194-195: “The values for the model norm proxies are acceptable for a tectonically active region.” Can you explain what you mean, or give an example of active area and provide a published reference?

We added: For tests A-C our dVp_loc is close to the anomaly of -5.1% found in this region in model UU-P07. See also answer to the previous question.

Lines 201-202: “There may also be a difference in the quality for catalogue picks that where possibly obtained by an algorithm without human intervention.” Do we know what percent of the picks published in ISC and NEIC catalogues are not reviewed by a human?

The ISC analysts review approximately 10-20% of all events in the ISC database (see www.isc.ac.uk/iscbulletin/review/). Such information is not available for NEIC, as far as we know. We now quote the 10-20%.

Line 224: it is not IFREMER that should be acknowledged but the FOF (French Oceanographic Fleet) operated by IFREMER. It may be a good idea to provide the DOI of the cruises.

Good idea. We added DOI's in the acknowledgement section.

Reviewer B

Figure 4: Amplitude and time scales should be illustrated in the figure. Many seismograms overlapped around the center of the figure. Please fix it so that it is easier to see.

We added information on time scale and amplitude scaling in the legend. Note that the seismograms are only in this figure to indicate their spatial distribution and cannot be displaced; figures 5 and 7 show seismograms individually.

Line 82-83: I could not perfectly catch the relationship between the SCARDEC moment tensor and “it is more representative for the high-frequency arrivals.”

We added that Scardec uses only the P wave segment, whereas CMT solutions are derived from periods > 45s and include surface wave information.

Line 87: Where did the authors use moment rate functions from SCARDEC?

We mention that SCARDEC was available for 7% of the events

Table 1: Units of each parameter should appear in the table.

DONE

Line 110: Table 2 should be cited in this line.

DONE

Line 185: Is a suitable citation about the large negative anomaly necessary?

DONE — see response to Reviewer A.

In addition to these edits, we have made a small number of minor grammatical improvements and corrected a few typos.