



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-823-RC1>, 2022  
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## **Comment on egusphere-2022-823**

Anonymous Referee #1

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Referee comment on "Ocean bottom seismometer (OBS) noise reduction from horizontal and vertical components using harmonic-percussive separation algorithms" by Zahra Zali et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-823-RC1>, 2022

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The manuscript covers a noise reduction method for OBS (ocean bottom seismometer) data. OBS are inherently noisier than their land counterparts due to the noise sources in the oceans. It is crucial to clean the contaminated time series to be able to improve analysis methods, e.g. tomographic imaging, receiver function analysis, etc.

The overall method of HPS (Harmonic-percussive separation) has two steps: SIM and MED. First, SIM (similarity matrix) separates the monochromatic and the harmonic noise. In the second step, MED (median filtering) is applied along the time axis of the spectrogram to suppress percussive events and enhance harmonic ones. The method has been previously used on harmonic volcanic tremors and was extended in this manuscript to OBS data.

Further, the manuscript shows how the method on the example of real (DOCTAR experiment) and synthetic data is improving the signal-to-noise ratio.

Generally, I would have liked to see this method applied to a larger dataset. DOCTAR only covered a small area. I would expect that the signals and noise throughout the network are similar to each other. Noise in other parts of the Atlantic Ocean, the Pacific Ocean or the Indian Ocean might show other challenges. It would have been nice to see the method applied to other OBS experiments. Other than that I have only some minor specific comments:

- L.148 - 154: You are mentioning the head buoy as a source of harmonic noise, but what about the flag? Can it also play a role or is the strumming of the head buoy overshadowing the flag signal?
- L. 351 - 353: You are using qseis for generating synthetic seismograms. Were Source Time Functions (STF) used for synthetics? It is a minor point (and no action is

required). There is probably no considerable difference between the tests, but a more realistic STF might even improve some of the cross-correlations.

- L. 356-358: Your noise sources were picked at the beginning (N1), during (N2) and after (N3) tidal currents. How do you ensure the signals are not "contaminated" with other noise sources, such as storms or ships? Would that even matter for the analysis?
- L.542-551: It would be nice to mention how efficient the algorithm is.
- Figure 1: Why don't you show the hydrophone channel? I think it would be nice to see it as a comparison.
- Figure 2: This figure is a bit confusing because not all the acronyms are in the caption (e.g. X', H, R...). They are defined in the text of the manuscript but it would be nice for completeness to have everything in the caption.
- Figure 3: Here, it looks like the N3 noise source is close to the earthquake (or the arrow is even pointing at the earthquake). Did you ensure that the noise, which was added to the synthetics, was earthquake free?