

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2  
<https://doi.org/10.5194/nhess-2022-196-RC2>, 2022  
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## Comment on nhess-2022-196

Anonymous Referee #2

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Referee comment on "The effect of deep ocean currents on ocean-bottom seismometers records" by Carlos Corela et al., Nat. Hazards Earth Syst. Sci. Discuss.,  
<https://doi.org/10.5194/nhess-2022-196-RC2>, 2022

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The authors present the results of studying current induced noise in ocean-bottom seismometer data. They connect well-known noise generating mechanisms like short-period head-buoy strumming and long-period tilt and compare it to tidal recordings. The findings are definitely worth to be published, but the presentation is not sufficient enough yet. The discussion should be extended by information about the horizontal components and currents in the study area. I also recommend to show the spectrograms without normalisation to allow a comparison of amplitudes.

### *General remarks on the content:*

- There is no information about currents and tides in this area described in the text. The different directions of deep water currents and tidal flows are essential for your conclusions, but how are they related at the OBS locations shown here? How does the sea floor topography affect the tides and currents, can this explain differences between the OBS? The maps shown in <https://doi.org/10.1016/j.ocemod.2018.08.003> suggests this. Can the pattern of currents explain, why only 3 out of 24 OBS are affected by this? Can you estimate current speeds out of the noise?
- Why is only the vertical component used for this study? The currents and most OBS structures discussed in the text (frame, flag pole, antenna) are not omnidirectional, therefore differences between the horizontal components might give additional insights. Also should the orientation of the OBS be considered, especially for the discussion of the antenna and the flag pole. Are they oriented in a direction to the currents, that resonances can be excited at all?
- The findings of this study are very interesting. Unfortunately, the manuscript does not emphasise the new findings enough. All mechanisms described here have been discussed

before, long-period tilt as well as head-buoy strumming. The combination of this leads to new insights, but this needs a more detailed discussion taking into account all information available.

*General editorial remarks:*

- Title should be more specific, this is not a review article, but focuses on special effects of a special OBS design.
- Please check references, several references mentioned in the text are missing in the list. Please check spelling of references, e.g. Stähler et al. was misspelled several times.
- Please check spelling, there are some mistakes. There are several very long sentences, which are difficult to understand.
- The OBS were named "NT OBS..", this suggests that "NT" is an official FDSN network code, which it is not (it is the code for the US geomagnetism program).
- Spectrograms: all spectrograms are normalised and, additionally, different color palette tables were used. This prevents the comparison of amplitudes, especially for the tilt noise. E.g. in Fig. 9, it seems that there is a very strong tilt noise all the time. Other signals like the microseisms look very different at the various spectrograms, this is very confusing. I strongly recommend to use real amplitudes and one common color palette table only.
- You discuss a large frequency range, switching between "Hz" and "seconds" is sometimes confusing. Please give both values, e.g.: "10 Hz / 0.1 s" .

*Text:*

- Line 19ff: The references seems to be chosen very arbitrarily with emphasis on own projects. OBS are common instruments, so it is not necessary give references here.
- Line 23ff: Please add the usage of hydrophones to this paragraph, which are important to understand noise. You refer to hydrophones (line 96) later, so it should be introduced before.

- Line 35ff: The noise discussed in this paper is not "self-noise", it is noise generated by currents. Electronic self-noise is an important criteria for the performance of the seismometers. E.g. the Guralp CMG-40 seismometers have a very high self noise below 10 seconds, this is clearly visible in the PPSD plots.
- Line 105: A PhD thesis might not be the appropriate reference here. You might cite some papers resulting from this project instead.
- Line 109/177: Is OBS03 located in the D. Henrique basin or at the Marques de Pombal plateau?
- Line 122: In this paper, only the behaviour in currents is compared, "performance" includes much more, e.g. self-noise of seismometers, data retrieval, etc.
- Results and discussion: Please split this section into two parts. The discussion is so far not sufficient enough and should be separated from the pure results.
- Line 188ff: Please move this paragraph to "Harmonic tremor structure".
- Line 196ff: How did you determine the sources for the various frequencies? How do you know, which frequencies belong to the flag pole and the radio antenna? Essing et al. discussed this issue in detail. Please explain the "natural frequency of OBS-sediment coupling".
- Line 230/231: The microseisms appear also in other spectrograms, please mention them also there.
- Line 232ff: This explanation is not sufficient enough. Why are you sure, that the 3.8 Hz signal is the sediment coupling? What should the reader see in the figure? The 3.8 Hz signal is hardly visible.
- Line 273: Essing et al. described the results of an experiment, where the head buoy was fixed and the harmonic tremor disappeared. This is not the best final sentence for a paper, maybe you add some more words about the consequences of your findings.

*Figures:*

- Fig. 1: The different scaling for upper and lower part of the spectrogram is confusing. Maybe you should use "frequencies" on the left side and "periods" on the right side. Please mark and mention all features visible in the spectrograms, e.g. whale calls, microseisms, etc. Is the noise gap at 1 Hz real or an artefact? Which parameters (Window length, etc.) were used for calculating the spectrograms? Caption: consider to write "Spectrogram instead of "Noise domain". First sentence is too long and confusing.
- Fig. 2: The OBS locations and annotations are very difficult to see and read. Maybe the map section should be chosen differently. Please remove all annotations, which are not mentioned in the text, most geographic features are not relevant for this paper. Some arrows or similar showing the main bottom currents should be added, see <http://dx.doi.org/10.1016/j.margeo.2015.09.013> for an example.
- Fig. 3: I do not think, using pictures from web sites is a good idea. Are there no own photographs from the NEAREST experiment available? Caption: Why is the caption "NEAREST" when just some OBS are shown?
- Fig. 4: Caption: The description of seismometer and hydrophones should be moved to the text. Or add the same information to Fig. 3. The last sentence is incomplete.
- Fig. 5: Why is there an abrupt change in amplitude at 1 Hz, is this an artefact? Please provide a scale for the Sines curve. Caption: The last sentence can be deleted, the nature of tides is already explained in the text.
- Fig. 8: Why are the amplitudes normalised? A comparison of amplitudes at the different stages would be very interesting, e.g. is C constant all the time? How was the lower part of the figure calculated? - Fig. 11: Are these spectrograms also normalised?
- Supplement: Are the seismograms also normalised or do they have the same scaling? In some spectrograms, e.g. 2017-09-12 12:00, are strong noise amplitudes ("red blobs") visible below 1 Hz. What is this?