

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2022-196

Wolfram Geissler (Referee)

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-RC1>, 2022

Dear authors,

thank you for sharing your interesting results and innovations about the influence of environmental/oceanic parameters and technical limitations in the acquisition of ocean-bottom seismological data and ways to improve the quality of the recordings. The manuscript provide a highly valuable documentation how technical developments can lower the impact of instrument-generated noise on one side, but keep the handling of the instruments at the open sea still easy enough. Your contribution focuses on two important frequency bands that are influenced by instrument-generated noise, that is originally caused by the action of deep geostrophic ocean bottom currents and temporally varying currents forced by the tides.

I think the manuscript needs some moderate revisions before it should get published. I provide most of the comments, questions and suggestions in the annotated manuscript. I will list the most important ones below. I hope they are helpful and constructive to improve the manuscript.

General comments:

The focus of the manuscript is on the noise that is generated by imperfect ocean bottom seismometers that were and still are used, and how to design better instruments to reduce that noise. I think you provide clear evidence that the new instrument designed at IDL has a much better performance regarding the noise impact of bottom and tidal currents. You should better focus on this aspect throughout the manuscript. It sometimes reads still like two separate manuscripts about the noise recorded previously with the standard OBS and the newly designed OBS. In that sense also, the title of the manuscript does not fully meet the content yet.

The manuscript needs in parts some restructuring. I would move several paragraphs to other chapters, e.g., lines 135-145 reads to me more like Introduction but not Data and Methods. Maybe the complete section 3 (Results and discussion) needs a better structure. Also results and discussion could/should be separated.

Also the model of Voet et al. (2020), which seems to be a fundamental base for the study should be explained in more detail. You take the amplitude of the noise in certain frequency/period bands as a proxy for current speed. I do not fully get that yet from the manuscript. Also, you should indicate later in the manuscript that you always interpret the proxy but not directly measured current speeds!

You discuss the influence on permanent geostrophic and tidal components of bottom currents. However, you never introduce the existing knowledge of currents in the study region. At least a map and short introduction to existing knowledge on bottom (and tidal) currents is necessary as a base for your interpretations.

The instrument-sediment coupling was not at all explained and discussed but appears in the conclusions. Either extend that topic or leave it out.

Could you a bit more elaborate on the differences between NT OBS 01 and NT OBS03, with respect to their different locations (topography, bottom current regime).

Specific comments:

I miss a short statement about potential effects caused by the use of different types of seismometers.

Use abbreviations only, if you really need them. And if you use abbreviations all should be explained within the manuscript text and within the figure captions, separately.

How do you know about the noise frequencies caused by the antennas? Why the noise is not excited by the radio and flash light beacons?

What are "flow patterns" to you? (e.g., line 175)

What is a "energetic phenomenon"? (Line 221)

The language should be checked carefully at the end.

The Conclusions should be shortened. (but the discussion could be extended)

I do not fully get how you judge on flow directions. Can you also discuss briefly the influence of the distance of the studied stations to your tide reference station? Could you also show examples of stations that are not influenced that strong? Why these stations provide less noisy data? Is it all related to the currents or could there be other causes of noise (tremors etc.)?

How the flow gets turbulent? Is it the complete flow that gets turbulent, or do just the OBS components cause turbulences at a certain flow speed?

The figure should be marked with important information discussed in the manuscript. I put my specific comments next to the figures. It would be great if you could fully describe the plots in the captions or the manuscript text. There are sometimes features, that are not clear to the reader (related to the discussed problem or just something else not relevant to the study).

Why do you use different color scales throughout the manuscript?

Be consistent in using terms like "band" or "domain". (e.g., line 266)

With best regards, Wolfram Geissler

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2022-196/nhess-2022-196-RC1-supplement.pdf>