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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Method for testing the calibration of acceleration and pressure gauges installed at the ocean bottom" *by* Mikhail Nosov et al.

Anonymous Referee #1

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[General comments] This article proposes a way for testing accelerometers and pressure sensors of seafloor cabled observatories by taking ratio between power spectra of acceleration and pressure records. The idea is very simple but its background theory is well established. It looks that the proposed method can identify errors in records either of accelerometers or pressure gauges effectively. However, this idea was already pointed out by early work of the authors group (Nosov et al., EPS, 2018). I could not find any significant advancement since the previous paper, in the present manuscript. The dataset (accelerograms and pressure records obtained by DONET in Japan) for testing the proposed method is completely identical to the previous work, in which the relation between the seafloor acceleration and pressure is proved by analyzing the field

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observations. The results presented here is not new at all, even the previous paper did not show the power spectra ratios explicitly. Therefore, I have very negative feeling about the novelty of the presently submitted manuscript and would not recommend the editor to accept it for publication.

I would suggest to the authors that they develop discussion on applicability of the method in practice. As the authors concluded, the method works only when the system records seafloor motions strong enough. Quantitative elaboration of this aspect may increase the value of this work. How large ground shaking would be necessary for the test with this method? How often can we expect such strong shaking is observed by a certain seafloor cable system? The limitation does not come only from the amplitudes but from the durations of the signals, as the authors also pointed out. What would be the minimum length of records to assess if the sensors work properly? Since the duration is related to the sizes (magnitudes) of earthquakes, this estimation is also important to know how often we can make the test using the method proposed here. In other words, it is very hard to see if the proposed method is practically useful to diagnose seafloor sensors remotely without the discussion of this kind. The systems deployed along subduction zones may have good chances but I'm not sure if the method will be useful for SMART project, introduced in the manuscript, which may be placed on low-seismicity areas.

[Specific comments] A textbook written by Saito [2019]* would be cited in the explanation of theoretical background (section 2). The textbook gives comprehensive description regarding the ocean acoustic waves and the relation between bottom pressure and acceleration. * Satio, T., Tsunami generation and propagation, Springer, doi:10.1007/978-4-431-56850-6, 2019.

The meaning of a constant 0.366 appearing in equation (3) should be explained briefly. Although the physical meaning of the equation is explained, it is not clear why the coefficient must be 0.366 in this definition.

I'm curious about the treatment of tide variations in pressure data. Tide variations are well outside of the frequency band for taking spectral ratios, but it must affect the averaged total pressure (P-bar), if not removed from the records.

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