

Interactive comment on “Passive Acoustic Measurement of Bedload Grain Size Distribution using the Self-Generated Noise” by Teodor I. Petrut et al.

Anonymous Referee #2

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This manuscript presents an inversion strategy of hydroacoustic data in order to estimate the grain size distribution of bedload material. The authors use a quite innovative approach in this research field, namely the monitoring of bedload transport using surrogate techniques, leading to interesting results. The applicability of the presented method is constrained by strong assumptions but this study remains of significant importance for the development of quantitative bedload monitoring techniques using acoustic sensors. The methodology is sound but the general presentation of the paper should be improved. Overall, I do not have any critical comments, most of them concern minor (typo) errors or a few points that need to be further clarified.

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1. P2/L3: Reference (Parker, 1990) must be mentioned here.
2. P2/L5: If it concerns many scientists, it would be preferable to cite more than one article (or indicate “and references therein” if it is a review article).
3. P2/L7-12: Here you should cite appropriate references.
4. P2/L12: You could introduce here the term SGN, for instance at the end of the sentence “, so-called the bedload Self-Generated Noise (SGN).”
5. P2/L18: replace bear by contain.
6. P2/L22: “Geay et al., 2017” instead of “Geay, 2017”.
7. P2/L24: The year for reference Krein et al. is wrong (2016 instead of 2014). You can also cite Wyss et al. (2016).
8. P2/L25: You should avoid the use of too many acronyms, notably here for a section title. Replace “SGN model” by “Bedload Self-Generated acoustic Noise (SGN) model” or something equivalent.
9. P4/L2-4: three times “mathematically” in three consecutive sentences. Please rephrase.
10. P4/L16: “The material parameter. . .” there is no verb in this sentence. Explaining equations and parameters can be done in a concise manner but, as a general comment for this theoretical part, your presentation sometimes suffers from a lack of clarity.
11. P4/L30: The acronym FT for Fourier Transform is not explained.
12. P5/L1-2: “is” is missing two times before “FT of hertzian. . .” and “angular frequency”. The definition of the scalar, angular frequency should be expressed here.
13. P6/L1: It is good to provide an example of waveform computed with Akay’s model but, for the sake of completeness, you could also provide the expression of Eq.7 from Akay and Hodgson (1978) as appendix.

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14. P6/L25: You have to choose between “to reduce” or “to eliminate”. However, this sentence appears also insufficient to justify the choice of the sphere-slab model. Could you make a link to the last section and figure ?
15. P7/L14: The reference to Eq.10a in this sentence is somewhat unclear. Please consider rewriting.
16. P8/L7: “ln(D) coincide the D50 is ...” ?
17. P8/L18: “as it the phase shift” ?
18. P8/L23: three times the word “analysis” in the same sentence. Please rephrase.
19. P8/L28: “material of sediments” could be replaced by “material properties (i.e., density, Poisson’s ratio, Young modulus)”.
20. P8/L28: This is not 12% actually but a little bit more.
21. P9/Section 2.4: You should discuss some of these assumptions in light of the recent work by Geay et al. (2017, “Spectral variations of underwater river sounds”, EPSL).
22. P9/L19-22: You should recall the meaning of acronym LS for least square at line 19 instead of line 22.
23. P9/L20-21 & section 3.1 L12-18: Refer to Figure 2c or, eventually, you could make a figure depicting several PSD for different size classes in order to easily gauge the variability of the acoustic spectra.
24. P9/L23: Consider replacing “solution” by “least square solution” or “minimum solution”.
25. P10/L27-29: This part, which concerns the signal processing, is too short. You should give more details on the processing parameters you used.
26. P12/L2: “SGN map” should be replaced by “SPL map” as indicated in the figure.

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27. P12/L8-10: You should briefly argument how you infer the probable dominant noise sources in their respective frequency bands using simulation results and previous studies.
28. P12/section 4.1.2: Did you consider testing smoothing functions over logarithmically spaced frequencies ?
29. P13/L11: Figure 6c instead of Figure 7c.
30. P13/L12: The term “noisiest” could be misleading since it can also refer to unwanted noise sources. You can add something like “in the bedload frequency band”.
31. P13/L21: Use “by” instead of “in the paper”. The notation Deq must be written next to “equivalent diameter “at line 20.
32. P13/L26: “a certain value”, which one ?
33. P13/L28: “is 1-2 mm matches very well” ?
34. P14/L15: Please remove “observed to be”.
35. P14/L17: “follows quite decently”, not for $X \sim 45m$. You should already point out this discrepancy here.
36. P15/L2: Please consider rephrasing, for instance “The model in Eq.(9) only takes into consideration signal attenuation due to sound divergence, which means the acoustic propagation . . .”.
37. P15/L5-15: Referring to Geay et al. (2017, EPSL) would be appropriate. In conclusion to this paper, this discussion part is useful to assess the advantages and limitations of the presented approach.
38. The conclusion (as well as the abstract) are generally written in a comprehensive way. The last paragraph in the conclusion could be eventually reformulated. Even though relevant, the cost of the technique is maybe not the best argument to point out

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in the last sentence.

39. Tables and Figures: Overall, tables and figures support well the text. Event though not critical, legend and axis labels are too small and the arrangement of subfigures is not well balanced for most of the figures. Fig. 6c- Please consider to set the background color as white, as done for Fig. 6a. You could also report the cross-section on this panel and keep the same y-axis direction between Fig. 6a and 6c. Two “in” in the caption (“in in units of dB. . .”). Fig. 10- replace “medallion” by “inset”. The title of table 3 is not enough explicit.

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