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Discussions

Interactive comment on "A Surface KInematics Buoy (SKIB) for wave-current interactions studies" *by* Pedro Veras Guimarães et al.

Pedro Veras Guimarães et al.

pvguima@gmail.com

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Dear colleagues, we appreciate the effort of the editor and reviewers. The reviewers comments were particularly useful for improving the text and clarify some missing information. You will find attached a detailed point-by-point answer to all the comments and questions. We are looking forward to your opinion on the possible publication in Ocean Science. Although most comments gave rise to corrections, the few on which we did not agree with the reviewers have led to a more detailed rewriting of the corresponding section of the paper, as detailed in the attached rebuttal.

1 Author's response

A detail response to the reviewers are described below. The comments from the reviewer are reproduced in bold, and our answer is in normal font.

The manuscript describes a novel low-cost surface kinematic buoy, the SKIB system, composed of a GPS and an accelerometer. The intention is to capture waves, currents and their interactions. The paper is structured as a method paper (introduction, parameters, setup including in situ and field validation, an exemplary field application, and conclusions) and well written. I see a couple of minor issues, that can be improved, however in general I consider it publishable after inclusion of the following aspects. Minor issues and suggestions:

1. **Title: I would not try to use upper cases for the abbreviated SKIB, but to stick to lower cases (also throughout the text). It confuses the reader and it is easy to guess why SKIP was chosen as a systems name. Additionally I am not sure, if double plural is correct for the last two words or if it should read ". . ..for wave-current interaction studies"**

   We modified hte the name for lower cases "surface kinematic buoy" and corrected the plural as suggested.

2. **Abstract: Well written and structured. Contains all essential information. I suggest to quantify the outcomes in lines 8 and 9.**

   We have added the following sentence to the abstract, *"The use of low-cost accelerometers and a spherical ribbed and skirted hull design provides acceptable heave spectra E(f) from 0.09 to 1 Hz with an acceleration noise level (2 π f)4 E(f) close to 0.023 m2s-3."*

3. **L21: What do you mean by "short instrumented spar buoy" Measurable parameters and processing:**

A spar buoy is commun used to describe the shape of the buoy. A spar buoy is a tall and thin buoy that floats upright in the water and is characterized by a small water plane area. (https://en.wikipedia.org/wiki/Spar_buoy)

4. **L11: Why a linear interpolation and not any other function?**

   Linear interpolation is the most simple method. We do not expect significant differences with other methods.

5. **Buoy design and validation: Page 4, L18: Who is T. T. Janssen and why mentioning here?**

   We have removed this confusing sentence. For your information, T. T. Janssen is not the CEO of Spoondrift (https://spoondrift.co/) and has been working on wave buoy design for many years (e.g. Herbers et al. 2012).

6. **Page 4, L19: Provide paper reference instead of internet link.**

   We are not aware of papers describing this buoy. We have thus preferred to remove this sentence.

7. **Page 5, L1ff.: The description of the mechanical design is rather short and not suited to follow, if someone wants to repeat your experiment. Please provide more information on the mechanical design (drawing in the appendix?) and also specify, what alternatives had been tested respectively, why this design is the best.**

   The following sentences has been added: *"With all these constraints in mind we found that a nearly spherical shape with ribs and an additional skirt provided a good water-following behavior, whereas spherical shapes performed more poorly. Three-dimensional printing was tested without much success due to the porosity of the printed material."*

8. **Page 5, L4: figure 1.b and 2.a,b. Subsection heading: SKIB electronics (be consistent using upper/lower cases in headings)**

   We have corrected all to lower case.

9. **Page 5, L13: 2.5 VDC Page 5, L15: programed (you used American English throughout the text)**

   We have corrected to American English throughout the text.

10. **Page 5, L16: the Xbee module was not described/mentioned before**

    Xbee is indeed a particular brand of modems that uses the Zigbee protocol (based on IEEE 802.15.4) . We have removed this mention of Xbee to make the text less confused.

11. **Page 5, L17: the 802.15.4 specification seems not necessary here**

    Indeed, this was removed for clarity.

12. **Page 5, L20: . . .are mounted. . . Page 5, L21: . . . vacuum-sealed (see figure 1). Page 5, L23: In those buoys the IMU SBG Ellipse were used, set to an. . . Page 5, L28: The laboratory tests. . .**

    We have followed these modifications in the text.

13. **Figure 1: Explain STM and SBG in caption. Explain SKIP meaning in caption. A figure with caption should be understandable in its own. "Microcontroller board. . ."**

    The caption modified in order to explain all the main electronic components as suggested.

14. **Figure 2: BBWAVES is mentioned here for the first time and not explained in the text.**

"BBWAVES" was replaced by "oceanographic campaigns", as "BBWAVES" was the name for the experiment "Broad Band Waves experiment".

15. **Page 8, L7: Who can something follow 3 methods? Why not restrict to one citation?**

    We have kept only the last reference, which is indeed based on the two previous works.

16. **Table 1: . . .height. . . (not hight). Check text, this happened 3 times in the manuscript.**

    This typo has been corrected.

17. **Page 10, L9ff: You state that parameters overlap within confidence intervals. True for Hs but really close. Please comment.**

    The differences are commented in the following lines, *"The Largest differences are between the SKIB STM and SWIFT buoys and are associated with the filtering of low frequency content in the SWIFT processing chain (fig.3.b), and unfiltered low frequency noise in the SKIB STM. However,"*

18. Page 20, L11: The largest difference. . . Page 20, L11: associated (doubled) Page 11, L9: . . .with RSME. . . (in figure 4, you use RSME not RSMD) Page 11, L19: measured (doubled) Figure 4: Please explain NRSME. Wave evolution in current gradients: Figure 6: Here you name the region: "Four channel" while in the text you name it "Chenal du Four". Be consistent. Page 14, L1: Figure 8 is mentioned in the text before figure 7.

    All the text correction proposed were accepted and included in the text.

19. **Figure 7: Axis fonts used differ from other figures.**

    Same fonts were not available because the figures were made using different softwares.

20. **Figure 8: ..The color of the lines follow. . . ??**

    Text correction accepted.

21. **Summary and conclusions: Page 17, L2: Can you quantify "low-cost"? Either here or before in the text. You talked about the sensor cost but never mentioned the whole system.**

    The cost of electronics and hull is now given in section 3.2 *"Standard prices for all the parts in the year 2015 was about 1100 euros for all electronics, half of which is for the Iridium and GPS equipment, and another 1100 euros for the hull and mounts inside of the hull. That expensive choice of the hull was, in our case, justified by a possible re-use for other oceanographic applications."*

22. **General comment: This section is rather short and could be improved by a deeper reflection on the implications and applications of the SKIB, its next steps and further improvements.**

    We have now expanded section 5, in particular adding some comments on the costs and the performance of the two SKIB models, as well as a reference to the recent paper by Sutherland and Dumont (2018), who used a SKIB-SBG.

23. **References: Not consistent in using abbreviated or full journal names, e.g. for J. Phys. Oceanogr.**

    Journal abbreviation removed.

2 Author's changes in manuscript

A detailed version of the modifications in the manuscript are add in a separate PDF version of the manuscript where modification from the previous version are highlighted in the text.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-45/os-2018-45-AC2-supplement.zip

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2018-45, 2018.