Review of Morgane Mignot: “Hydro-acoustic sediment flux profiling in highly turbulent particle flows”

Reviewer: *Markus Reinert*

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Main result of the article:

The article compares the performance of a multi-frequency ACVP with the performance of a mono-frequency ACVP. The presented study shows that when the former is used for the same measurements as the latter, then they give coherent results. That is interesting, because the multi-frequency ACVP gives more information in a single measurement. The results were obtained with a lab experiment modeling a river flowing over a sand bed.

A) Overall content:

1. Is the overall purpose of the study and/or central question clear?

   Yes, the context and the main task of the study (testing the new device against the classical one) are clearly presented in the Introduction.

2. Does the interpretation of the findings answer the overall question of the paper?

   Yes, the Discussion and Conclusion answers the question raised at the beginning by stating the measurements are coherent.

3. Is every paragraph and sentence in the paper relevant to the overall question?

   Yes, every paragraph is relevant; it brings us one step closer to understanding the instrument, the experiment, or the obtained results.

4. Are there portions of the text that could be omitted?

   The phrase “The mean Reynolds shear stress profiles were drawn” in paragraph [12] could be omitted. It is hardly interesting for the reader which figures were drawn, but rather the results they give.

   The repetition between paragraphs [5] and [13} in the explanation of mono- vs multi-frequency ACVP could be omitted.

5. Is the overall organization of the paper clear and effective?

   The structure of the paper is classical and well suited for the presented study.

   One could structure the Method part more clearly by separating the description of the instrument from the description of the experiment.

   Equation (2) and paragraph [8] should be put in the Method part, since they are not results of this particular study.

B) Individual sections:

1. Does the title adequately represent the content of the paper?

   The title presents the general topic clearly and adequately.

   It does not mention the mono- vs. multi-frequency comparison and so it does not contain the main result of the study.

2. Does the abstract clearly and concisely summarize the paper and state the main results? Does is contain all needed information (context, need, task, object, findings and conclusion)?

   The context, need, objective and experiment environment are explained well in the abstract. Again, the mono- vs. multi-frequency comparison is missing.

3. Does the introduction provide enough context to the readers? Does it state the need for the work? Does it state clearly what has been done to address it?

   It is a great idea to start the Introduction of the article with the big global issue of Climate Change!

   The Introduction clearly presents the need for this study as well as the state of the art before this study.

   The reader would be prepared better for the rest of the paper if an overview of the article was given in the Introduction.

4. Does this paper put the progress it reports in the context of existing published work? Is there adequate referencing and introductory discussion?

   This paper shows the importance of the progress it reports by referencing existing published work in the Discussion. The Introduction discusses why this study is needed by presenting the state of the art.

   Existing published work is mostly referenced to show characteristics of the measurement device. It would be good to also use references in the discussion of the results. Also the beginning of [3] could profit from another reference.

All of the referenced sources are by the same author, Thorne. The author could try to get some more variation here.

5. Are the material and methods used in the study clearly explained? Can you point out what is special, unexpected, or different in the approach compared to existing published work? Does it contain too many technical details?

   The measurement device is explained in great detail, because it is the object of interest for this study. The experimental setting is clearly explained. Both of these explanations are supported by helpful figures.

   Special about this study is, that they use a "novel hydroacoustic measurement instrument". They do not only refer to papers that show how this device can do other tasks than a previous model, but they also proof with their study that this device fully replaces the previous version.

   I think the given technical details are essential for researchers in the field, but are difficult to understand for someone from a different research area like me.

   In paragraph [5], the sentence "It permits to estimate the sediment flux." could profit from further explanation or a reference.

   The word "Theoretically" in paragraph [6] raises the question of what it contrasts to. It should be explained directly what is practically the case, instead of later in paragraph [8], so that the the reader is not puzzled until then.

   The transition between Paragraphs [6] and [7] is clear and makes sure that the reader follows the explanation of the method.

6. Is the results sections clearly and concisely written? Are there logical and smooth transitions between sections, subsections and between paragraphs?

   Paragraphs [9] and [11] are concisely written. They clearly present their key message by putting the main result into the beginning of the paragraph.

   In paragraph [9], one should say what is meant with "graphical shape", that is, which parameters are of interest.

   Paragraph [12] raises the question, why other graphs are not "pertinent", which is left unanswered.

   As mentioned in A5, paragraph [8] and parts of paragraph [12] should be placed in the Method section. This would permit to focus in the Results section on the main outcomes and to put the key message of [12] at beginning of this paragraph.

   The transition between paragraphs [8], [9], and [10] is smooth.

The transition between paragraphs [10] and [11], where the author switches from normal to radial velocities, might be clear for an informed researcher of this area (which I am not).

Paragraph [10] prepares the reader for paragraph [12] with the phrase "It will be later used". Good!

See also my comment in B8 below regarding paragraph [10].

7. Does the conclusion clearly state the most important outcome of the work? Does it address the questions stated in the Introduction? Does the conclusion just summarize the results or does it interpret the findings and explain what they mean?

   The most important outcome of the work is clearly stated in the first and central sentence of the Discussion and Conclusion, which thereby answers the question of the Introduction.

   The interpretation is very brief. In my opinion, the article would be even better with a more detailed discussion. For this, one could remind the reader of the parameters which were tested to arrive at the conclusion. This will put more emphasis on the key result. Also the implication of this study should be mentioned in the Conclusion, not only at the end of paragraph [11]. An outlook is mentioned at some points in the Results section; it can also be put in the Conclusion.

8. Are the interpretations and conclusions adequately supported by the evidence presented? That is, are the assumptions valid, is the methodology sound, is the evidence adequate, and do the conclusions logically follow?

   Generally yes, with one notable exception. Figure 4(c,d) presents measurements and trendlines, but the trendlines do not represent the data well. The trend shown in the data is not linear, so it is not clear why the author chooses a linear regression here. There is no discussion of this deficiency of the linear approach to model the data, which leaves the reader puzzled. Maybe it is necessary to limit the x-range of the values? Maybe the deviating values have a big standard deviation? Error bars are not shown so no conclusion regarding the last point can be reached.

   Apart from that, paragraphs [9], [11], and [12] are supported adequately by the Figures 3, 5, and 6, respectively.

   The conclusion follows logically from these results.

9. Are all parts of the text, references, graphics and tables necessary for the new results and main points to be understood?

   All figures and references are mentioned and referred to in the text. Each of them illustrates a result or a part of the methodology and is thus useful.

   The reference [Hurther et al., 2001] mentioned in [4] does not appear in the list of references.

10. Are the graphics and tables clear and their captions self-explanatory?

    Figure 1 is clear, but its caption should contain an explanation of T, R1, and R2 .

    Figure 2 is clear, but it should have a lighter background color.

    Figures 3, 5, 6 should be in English, should have bigger text size, and their captions should contain the key message of the figure.

    Figure 4 is not clear due to the objections mentioned above in B8.

C) Sentences and Wording:

1. Can you find grammatical mistakes?

   Abstract: remove either "exposed to" or "under" in the phrase "exposed to under well-known sheet flow conditions"

   [5]: "a" or "the" missing before "Mono-frequency method" and "multi-frequency method"

   [5]: Phrase is grammatically wrong: "but multi-frequency method could at the same time, gives the concentration and the sediment grains size". Suggestion: remove comma and "gives", then replace "could" by "gives"

   The Oxford comma is not used consistently and is sometimes used after the "and" instead of before: [2], [3], [5], [7]

   [7]: there should be no comma in "analyse and, interpret"

   Write "equal to" or "of" instead of "equals to" [6]

   Use rather a colon (":") than a full stop (".") before equations

   Don't use the ampersand symbol ("&") where it can be omitted [10]

   [12] contains the French word "et".

   I suggest to write "mono- and multi-frequency" with a dash ("-") after "mono"

2. Can you point to sentences that loose you (too long/complex) and do you have suggestions for improvement?

The length of sentences is adequate. They are not too long.

In [2], I do not understand the sentence "To hold it as much as possible, sedimentary transport models are becoming improved.", especially the first part.

I suggest to write "regarding the one of the bed" instead of "regarding to the bed one" in [6].

3. Are generally the action in verbs, characters in subjects and subjects near verbs? Can you find counter-examples? Can you point out misused nominalizations?

   The sentence structure is generally good. I did not find counter-examples

4. Is the writing cohesive? Does it flow well? Is the part of the sentence that links to the previous sentence at the beginning or the end?

   The writing is generally cohesive with the linking part at the beginning of the sentence. The only exceptions are in paragraphs [3] and [13], where there is no clear link between the 2nd and 3rd phrase.

5. Are the paragraphs coherent? Do the first and last sentences of paragraphs match? Can you find counter-examples?

   Yes, most of the paragraphs are coherent. Exceptions are:

   In [6], the description of the instrument is followed by the description of the experiment; this should be made two separate paragraphs.

   In [7], the phrase "The experimental part was followed by an adaptation of computer" should be put in a new paragraph.

6. Is there an abusive use of passive voice?

   In [3], the passive voice ("were made") hides the work done in this study and should be replaced by an active voice

7. Can you find a lot of useless words/phrases?

   Only those mentioned previously in A4.

8. Can you find complex words that could be replaced by simpler ones?

   I suggest to write "smaller than" instead of "inferior to", since it is more common in English.

9. Can you find too complex subjects?

   Nothing found.

10. Can you find inadequately used adverbs/repetition/excessive hedging?

    In paragraph [11], the hedging formulation "could be used" should be replaced by "We conclude that ... can be used just like the ...".

    Just before, an expression like "equality" is better suited than "similarities".

11. Is the use of tenses (past/present/future) adequate?

    Yes, with some exceptions:

    Abstract: write "improved" instead of "had improved"

    [2]: use simple present instead of gerund ("are becoming", "are controlling")

    [6]: write "sent" instead of "sends"

    [6]: write "can" instead of "could"

    [12]: use past instead of present in "deduce"

    [12],[13]: usage of "would" is confusing. Either change the time to present or future or explain what the conditional refers to.

D) Other comments:

Values and their units should be written on the same line; in [8] and [12], there are line breaks before the unit of a number.

The author sometimes writes "Hurter" and sometimes "Hurther" and the reference style changes form [] to ().