

Interactive comment on “Estimating Sand Bedload in Rivers by Tracking Dunes: a comparison of methods based on bed elevation time-series” by Kate C. P. Leary and Daniel Buscombe

Anonymous Referee #1

Received and published: 16 September 2019

This manuscript compares three different techniques to track bedforms and estimate bedload transport rates. This paper could be very useful for scientists who consider estimating bedload transport rates by bedform tracking, even though the paper does not include new methods. In general, the introduction, discussion and conclusion are very clear and informative. However, the methods and results are sometimes more difficult to read and need extra sentences to explain the concepts and how the conclusions are derived from the results. See my comments below.

Specific comments:

- P2, L30: “(also called altimeters. . .)”, depending on the importance of this message,

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should this be mentioned earlier in the text and not between brackets?

- What is the difference between the second and third research question at the end of the introduction? It reads like it is the same question, but then the other way around.

- What is the possible influence of the study area on the results? In the introduction there is a distinction between shallow and deep rivers when mentioning the practical use of the multibeam and single beam, is the study area shallow or deep? In the results, it is mentioned that there is a daily discharge variation that influences the bedform dimensions, how extreme are these discharge variations compared to other rivers and would this influence the advice in the discussion?

- Is there an effect expected of using virtual single and multiple single beam profiles based on the multibeam data, instead of measuring it separately and thus independently in the field?

- Section 2.2, L11-14: fluxes caused by dunes that are not aligned perpendicular to the flow are ignored to be able to compare the results between multibeam and single beam. How much is this expected to influence the estimated bedload transport? Is this taken into account in other multibeam studies? The effect of varying dune dimensions due to disequilibrium with the flow is taken into account, should transport direction be taken into account as well?

- Section 2.2, L14: “we have chosen not to incorporate the ISDOTTv2”: add a short explanation of what this method entails.

- Section 2.2: I think the readability of this section could be improved by removing some of the information between brackets and incorporate it in the sentence. E.g. line 9-10, line 13. This might be a personal preference, but in general it feels like there is important information between brackets throughout the paper and therefore this information seems less important and less clear. Another example is the definition/cause of bedform equilibrium in the first sentence of section 2.4. I think some definitions and

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explanations will be clearer when this is explained in extra sentences.

- Section 2.3, L28: what is the physical meaning of q_e and why does it need to be added? Could you add a short explanation?
- Section 2.3: Is it possible to calculate an estimated average wavelength from the time series since you can estimate celerity from this? Would it differ a lot from the spatial estimate?
- Section 2.4: this section misses an explanation of why the bedform disequilibrium is determined. Even though this is mentioned before, it would help the reader to repeat this here shortly. Furthermore, it is explained how equation 6 is used to calculate synthetic bedload transport estimates, but not how this is used to determine bedform disequilibrium.
- Where are figures 5 and 6?
- Section 3.2, L 24-26: how are the lag-corrected bedload transport and celerity calculated? And the errors? This might be visible in figure 5 and 6, but the pdf only shows figures 1 to 4.
- Section 3.3: I don't really understand yet how the sinusoid model is used to correct the data. I think this would be clearer if the method section 2.4 explains this better. What do you mean with the ratio between synthetic multibeam and synthetic singlebeam?
- Section 3.3, L 16: is this compared to the multibeam that is corrected for cross-correlation lag errors?
- Figure 4B: There is only one line for the multiple single beam? Shouldn't there be more lines for different spacings?

Technical corrections

- P1, L14: There is a "?" instead of a source

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- Figure1C: I do not see the grey section that indicates the area that is mapped with the single multibeam survey.
- Section 2.2, L8: Did you define BEP before this? You can for example add "(BEP)" at line 2 of this section
- Figure 2: there seems to be a caption missing to panel D.
- Figure2B: what is BEP5_2?
- Figure2C: "height vs wavelength" shouldn't this be "wavelength vs height" (Y vs X)?
- Figure3A caption: "estimates"
- Figure3C caption: ""single"
- Section 3.3, Line 11: "disequilibrium" and "single"
- Discussion line 30: is "(July)" missing after the 28.3%?

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2019-38>, 2019.

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