

Earth Surf. Dynam. Discuss., referee comment RC2  
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## Comment on esurf-2022-7

Dan Cadol (Referee)

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Referee comment on "Toward a general calibration of the Swiss plate geophone system for fractional bedload transport" by Tobias Nicollier et al., Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2022-7-RC2>, 2022

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This paper presents a valuable synthesis of efforts to clean SPG signals and make comparisons across field sites. While complex, I found the 'apparent' impact cleaning method to be clear in the end. But key to my understanding was Figure 7. I was a bit lost regarding the thresholds until I came to that valuable figure. Even after cleaning, the bedload flux prediction errors up to 5-fold suggest that there is still work to be done. But this is a major step forward. And it's difficult to know how much of the discrepancy is due to direct bedload measurement uncertainty or the SPG signal features and processing.

My main question/suggestion is also related to Figure 7. Using fixed thresholds is reasonable due to its simplicity. But Fig 7b suggests that thresholds that are functions of both MaxAmp and MaxAmp/f would exclude apparent pulses and retain real pulses more reliably, without the step-like effect of the fixed value thresholds mentioned by the authors. Given the computational and field effort required to obtain the MaxAmp and  $f_{\text{centroid}}$  data, this extra bit of analysis seems trivial by comparison. But perhaps the need to automate the signal reduction makes such an approach untenable? Or the exact slope and intercept of the dividing lines in Fig 7b that I am suggesting varies from site to site? A brief exploration of the differences in the MaxAmp vs. MaxAmp/f plots for different sites and flume setups, or just a comment on the differences, might help.

Another possible advantage of sloped thresholds is that you could make them non-overlapping, eliminating the double counting of packets. I wasn't entirely convinced by the statement that double counting impacts is a non-issue.

In Fig 7c&d, perhaps instead of (or in addition to) just showing the number of packets in the unfiltered and filtered data sets, you could show the fraction remaining after filtering. (ps- The dotted line in Fig 7d disappears for classes 7 & 8. Is this a plotting error, or a meaningful change?)

A few other small comments:

Fig 8b. There are fewer pulses/kg of the two smallest particle classes relative to the third smallest. Is this decline due to saltation? It's an interesting result, which was masked by the counting of apparent packets in the amplitude-only thresholding method. I would appreciate some thoughts about it in the discussion.

Line 545: Why are there fewer impacts/kg when the particle (or flow) velocity is higher? I would think greater particle velocity would produce more readable impacts, and thus more impacts/kg? I think the text is suggesting that it's because of more saltation, and thus skipping over the plate. Is this correct? Just a little more clarification of your hypotheses for this feature in the data would be appreciated.

Line 590: It's good to make clear that uncertainty in the direct measurements used for calibration is very real, and that this may contribute to weaknesses or biases in the predictive power of the modeled estimate. You do mention this, I just think it can be easily forgotten in general, and perhaps merits emphasis.