Review of "Toward a general calibration of the Swiss plate geophone system for fractional bedload transport" by T Nicollier et al

CONTRIBUTIONS AND AUDIENCE

This paper is a new contribution of the WSL team on the Swiss Plate geophone measurement technic. The author propose a method of analysis accounting for elastic waves resulting from impacts occurring outside the plate boundaries, with the final objective being to propose a general site-independent calibration procedure. They use both flume and field observations. This contribution will undoubtedly be of interest to the entire community using this technique.

The paper is well written and the science is of good quality. However I found the paper a bit long and sometimes difficult to understand. I made a few proposition to improve the text. I propose minor revision.

COMMENTS

Fig1: in the preprocessed signal do you record a value for each threshold or only the maximum?

Line 116: what was the mesh size for direct sampling? And related question: what is the size minimum detected by the SPG?

Line 118: a bedload sample is a mass collected for a given duration. It means that the corresponding "packet" is not the response of a single grain impact but probably a complex signal resulting from many impacts (or even a bedload pulse response)?

Line 119: what are the signification of the different letters in $k_{b,i,j}$?

Table 1: how was measured the flow velocity (surface?)

Line 146: you mean "uniform mixture"?

Line 173-174: what happens when several grains hit the plate simultaneously? (the question concerns SPG in the field)

Table3: it is very difficult to understand this table and its title

Line 180: Is this equation is site specific? First the material: can we consider that all sensors have exactly the same response? Secondly the bedload data may be specific to Erlenbach (mode of transport, grains velocity, density…)?

Line 183: I don't understand. You use the measured packets with Eq.1 for computing each size class present in a bedload mixture?

Line 200: why "in the lower size class"? I would expect that only large particles produce extraneous impacts?

Line 234-235: "The transported bedload mass associated with an individual signal packet is strongly dependent on the size of the impacting particle" what is difficult with such a sentence is that we don't really understand if you describe the movement of a single particle or of a bedload mixture..

Line 237: hard to follow. If I understood well you will apply a threshold to both amplitude and frequency. In the next sentence "lower threshold" and "upper threshold" concerns amplitude or frequency?

Line 250: could you tell a bit more about these coefficients?

Line 255: where do these equations come from? your experiments?

Line 257: If I understood, by replacing Dmj (the sieve sizes) in Eq 4 and 5 the objective is to isolate the packets associated with a given size class? Not clear (same for figure 5)

Line 279: you must imagine that you present to somebody who knows nothing about your work. Since I am reading, I am still lost with your upper and lower threshold.

Line 282: YES!! I have my answer!!

Line 284: The link between Eq.6 and 7 is not clear (I suppose that med station refers to all samples i)

Line 287: providing a general methodology for reducing the measurement uncertainties in a given site is already a nice objective. But the passage to a general inter-site calibration term is not trivial. It supposes that beside the plate response, all sites share the same transport characteristics. For instance if grains saltate over long distances (and different station length form one river to another) can we be sure that the impact rate reflect the real transport?

Line 346: the scatter is lower? Not so clear in the figure

Figure 9: add the light grey dots in the legend

Line 407: Direct sampling depends on the mesh size and the SPG measurements concern sizes >12mm. We know that in many mountain streams the contribution of gravels and sand can be very large. How can you take this into account?

Figure 10: How do you explain a small tendency to overprediction for lower transport?

Line 405: it questions on the pertinence of a general calibration coefficient. Also, many sites are equipped with SPG. Could it be possible to test the calibration coefficient with other sites?

§4.1: the paper is already very long and not easy to read. Is this paragraph really necessary? Or maybe to be reduced..

Line 484: It partly answer to see my previous comment about limitations of a general calibration

§ 488: Huge question which also concerns the contribution of finer fraction, how the saltation length of large elements affect the SPG detection…

Line 519: "In our SPG data, we have observed long packets containing multiple large peaks corresponding to several impacts occurring so quickly after one another that they were not detected as separate packets". It's a shame that this comment appears at the end of the manuscript because it's the image we immediately have in mind, which doesn't match the definition of the package in Figure1. It could be worth to explain early how you considers this aspect in your analysis.

§4.5 same comment. From the beginning I suspect grains velocity to play a role in the SPG response. I regret that this parameter is totally occulted in the paper. Even if you do not consider it in the analysis, it could be introduced earlier.