

Earth Surf. Dynam. Discuss., referee comment RC1  
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## Comment on esurf-2021-77

Anonymous Referee #1

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Referee comment on "Entrainment and deposition of boulders in a gravel bed river" by  
Pascal Allemand et al., Earth Surf. Dynam. Discuss.,  
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In the manuscript "Entrainment and deposition of boulders in a gravel bed river", the authors present a simple method using drone photos to evaluate bedload transport of boulders over several years. They relate the presence/absence of boulders to measured discharge to determine which flows are necessary to transport boulders of various sizes.

Although I find the technique to be interesting and simple and could thus provide simple measurements of bedload transport and flux, I also find the calculations to be filled with abundant assumptions, of which only a few are addressed, and no uncertainty calculations are presented.

- First, all of the calculations for transport are made based parameters for the full channel, but sediment transport is only analyzed on the bar, which should have much lower transport potential than in the main channel, given a potentially greater depth in the thalweg. Furthermore, is there any data of how the bar's sediment size distribution compares with that of the main channel?
- Second, the parameters for the transport potential based on flow carry multiple assumptions, in particular based on the friction factor and the shield parameter (which seems far too low). I think it would be useful with an uncertainty analysis around these values rather than just picking two values and claiming that it fits the data.
- Regarding the correlation for the transported boulder size and the discharge, this also carries quite a lot of assumptions that there is a relationship between transport size and discharge below ~80 cms. Perhaps it would be more advisable to carry out further calculations on boulder sediment flux with boulders >1 m so that you don't have to make assumptions regarding the relationship between boulder size transported and flow below max flows that you don't have data for.

I also had a very hard time understanding the GIS methods. I think there was some kind of language issue in what is meant by 'GIS'. I couldn't figure out if the authors meant 'orthophotos' or a specific analysis when referring to 'GIS'. 'GIS' usually refers to the

concept of geographic information systems or a software. Here they seem to use it as in referring to a specific data type of a map, perhaps? Furthermore, some kind of estimate of error in the size determination of boulders from the drone photos would be useful. How accurately could the boulders be digitized and thus quantified?

Further detailed comments can be found in the comments on the manuscript in the attached pdf.

Please also note the supplement to this comment:

<https://esurf.copernicus.org/preprints/esurf-2021-77/esurf-2021-77-RC1-supplement.pdf>