

Interactive comment on “Grain sorting in the morphological active layer of a braided river physical model” by P. Leduc et al.

Anonymous Referee #4

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This paper reports on a physical model experiment of a braided river that was set up to investigate vertical and horizontal variation in grain size. The model was perturbed with a constant discharge rate and sediment was recirculated through the model. Digital elevation models and grain size maps were constructed for 40 equally spaced timesteps, using photogrammetric and image texture analysis methods respectively. To my knowledge, the paper addresses an important gap in the understanding of grain size distributions in braided rivers. As the authors explain in the introduction, sampling in the field is a Herculean task and therefore the use of a “controlled” laboratory experiment is the most appropriate approach to investigating the research question.

I am confident that this paper will be of interest to readers of ESurf. It is written to a high standard and, in my opinion, requires minor revision before publication. The literature

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review is thorough and provides a full context for the investigation. The methodological description is also comprehensive although several aspects could be clearer, as I outline below. The analysis and discussion are appropriate but I believe more could be made of the equivalent texture maps.

Detailed comments:

P582 L20: What was measured in the field? A bulk distribution? What sampling criteria were used? What proportion of the bulk was < 8 mm? If a surface, or surface layer, sample was obtained then what are the consequences for the model scaling?

P583 L15: Can you provide a fuller report on the mean elevation errors? How many points and DEMs were considered? What was the standard deviation of this error?

P584 L21: Did the calculation of difference account for errors in the minimum and maximum surfaces i.e. was a minimum level of detection or probabilistic DEM of Difference approach used?

P584 L26: The term “deposit thickness” needs to be clearly defined. Is this equivalent to deposition during a one hour DEM sampling interval? This term may need to be clarified earlier within this section to improve clarity.

P585 L18: The dimensionless analysis is a key part of the analysis but it could be explained more clearly e.g. that this was done for each DEM? Is the initial bed depth referring to the first DEM, or the initial depth for each time period? Were there any compensatory patterns of erosion and deposition? If so, what are the consequences for the results?

P586 L14: Check brackets around Nelson et al., 2010.

P586 L22: Check brackets – I’m not familiar with this presentation format.

P586 L26: This paragraph may be easier to read if it starts with the sentence on this line.

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Discussion: The results indicate that an armour layer is not evident within the grain size mix of the upper most layer? However, winnowing of fines in this layer may be expected in a “real river”. Is this a consequence of truncating the grain size distribution at 8 mm? Also, it would be interesting to investigate whether there are any “signatures” associated with different depositional units: data are available here to consider the question at a finer spatial resolution than the “aggregate reach scale”.

Fig 1: Check use of negatives on axes and on axes labels.

Fig 2: Comment for (b) that longitudinal gradient is removed?

Interactive comment on Earth Surf. Dynam. Discuss., 3, 577, 2015.