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

### **Anonymous Referee #3**

Received and published: 25 August 2015

General comments: The authors present an analysis of vertical sorting over the surface layer that is subject to reworking in a physical experiment of a braided stream. The experiment was previously described by Gardner and Ashmore (2011). The main message of the paper, i.e., there does not seem to be significant evidence of vertical sorting in the physical braided stream, is clear and a finding that is expected to be significant to many readers. Although this is interesting, the referee does not quite understand why the authors do not discuss sorting issues in other directions, of which lateral sorting seems more relevant than streamwise sorting. A discussion on the similarities and differences regarding vertical sorting between braided streams and dune-dominated rivers is currently missing. The referee would propose to change the term "morphological active layer", because the term "active layer" is generally applied to the Hirano mixing layer that is required in numerical computations of mixed-sediment rivers. This

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numerical active layer (i.e., the Hirano mixing layer) is not necessarily the same as the "morphological active layer" that the authors consider in their paper, which may confuse the reader. The referee therefore proposes to change the name of the authors' "morphological active layer" to something like "layer of reworking" or "reworking layer", and its thickness to "depth of reworking".

More specific comments: - the title would be more informative if it sounded like 'Vertical sorting in a braided river physical model' - the introduction is quite extensive compared to the description of methodology and results. - Vertical sorting is not evident from the measured data, yet lateral sorting seems to be quite important. The current manuscript lacks a description of lateral sorting processes. - p583 the entropy method is not yet clear to the referee. - p584 and Fig1. The scatter in these figures is not negligible and this may not be reassuring. Can the authors comment on this? - p584line14-15. The term "equivalent texture" is not sufficiently clear to the referee. Are we here talking about a mean grain size on phi-scale? - p585 To avoid confusing the reader, the referee proposes to change the term "the active layer involved in particle exchange during bedload transport" to "the surface layer that represents the sediment that interacts with the flow at a specific time and so determines the rate and GSD of the transported sediment". - p585Eq1 and above and below. Here the term 'depth' is not used well. One needs to distinguish between "elevation" and "depth or thickness". Please also use different symbols for elevation and depth parameters.  $h(x,y)$  and  $\Delta H$  both are a "thickness", whereas  $H$  and  $H_{min}$  are "elevations". - p585line19.  $H(x,y)$  is not just the "initial" bed elevation, right? - p588lines2-5. Could the fact that the lower elevations of the "reworking layer" are slightly coarser than above have to do with the fact that there were bars migrating through the system that deposit the coarser fractions at the base of their fronts (eg Blom et al. 2003)? - Figure 3. The parameters plotted in Figures 3a, b, and c are different ones. Therefore please use different symbols, and describe the symbols. Please make a distinction between elevation and thickness. Please use the same colorbar for Figures 3a and 3b. - Figure 5. The caption says "Fine sediments are lighter than coarse sediments." Isn't this a trivial statement, unless we would speak of

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a difference in their mass densities?

Some details: - p579line7 near-surface → subsurface ? - p581line1 10.D90 → 10 D90 - p582line7 Can we start a sentence with "but"? - p583line13 The 'one hour intervals' need to be explained better. Is the flume drained before each measurement? - p586line22. The brackets are not well oriented. - p587line11. "almost identical" → "similar" - p587line14. Not sure if the term "the minimum surface" is well describing what you want to say. - Figure 4. Which two parameters are plotted precisely?

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

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