

Interactive comment on “Image analysis for measuring stratigraphy in sand-gravel laboratory experiments” by C. Orrú et al.

Anonymous Referee #1

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The paper gives a very clear and complete description and error analysis for an image-based technique for grain size analysis and mapping in laboratory experiments using sand-size non-cohesive sediment. The technique extends and modifies some similar work (e.g. Heays et al.), and usefully expands the range of possible methods available in laboratory experimentation. The authors provide complete and thorough explanation and documentation of the method and a useful example (in the case of Gilbert-type deltas) of its usefulness and advantages over physical sampling. The work is clearly of interest to a broad segment of experimental earth scientists. 1. The introduction mentions several circumstances in which size sorting may be important. The long-distance size sorting in rivers may be relevant here but local sorting effects are much more relevant. This might include grain-size sorting of fluvial deposits related to bars, bends, secondary flow structures and other floodplain processes. These are not mentioned

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in the introduction but are especially important in relation to flume experiments and physical models of fluvial landforms and sedimentary processes. 2. It would be useful to be explicit about whether the size distribution has three discrete components (which seems to be the case) or if the distribution is continuous and segregated at particular size intervals. This may be important for both the method and the interpretation of experimental results, and it would be useful to discuss this issue in the paper. 3. Does painting have any effect on particle density and buoyancy? 4. The paper omits another important set of developments in size mapping using both grain delineation and, especially, image texture approaches e.g. Carbonneau et al 2005, , Warrick et al (2009), Dugdale et al. (2010), Gardner and Ashmore (2011), and Black et al. 2013 for both sand and gravel-size sediment. Collectively these show that continuous grain maps may be obtained from image processing without recourse to artificial grain colour or artificial grain size distributions. Discussion of, and comparison with, these approaches would be very useful.

Minor revisions and comments: 1. Use of “stratigraphy” which is a very broad term with specific meanings in geological chronology, sequences etc. and describes an entire field of study. The paper is about local lateral and vertical size sorting only – perhaps use ‘size stratification’ or some other substitute. 2. P 977 lines 21-25 would benefit from re-wording. 3. P 981 line 15 the idea that the sediment could be replaced and the experiment reliably continued sounds dubious to me – it would be useful to demonstrate that this is really possible.

Paper is very well written but there are a few minor phrasing/grammar corrections that could be made after a careful copy edit.

Interactive comment on Earth Surf. Dynam. Discuss., 1, 973, 2013.