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

Anonymous Referee #2

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In this paper the authors developed and applied a technique to measure the stratigraphy in sand-gravel laboratory experiments.

I suggest to include, among the available freezing techniques, the paper by Marion and Fraccarollo (WRR, 1997), as they describe a methodology of extraction of bed samples followed by freezing, brittle rupture, photographs of the inner undisturbed surfaces, re-composition in the original position, unfreezing and restart of the run, obtaining an almost no invasive technique for the analysis of evolving mobile armouring.

The phenomenon referred to as Gilbert delta progradation may be unfamiliar to many readers (and to myself) and therefore it deserve some more description in the paper. In Figure 1 I ask to indicate how the different lines refer to different times. What is the difference between the E1 and E2 tests? Were the tests operated with different initial

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or boundary conditions?

Among the steps of image analysis, it is quite difficult to me to understand point 4 (4. colour classification, or segmentation, by k-means clustering to obtain the cluster centres). What are the “a” and “b” colour coordinates (chromaticity)? Segmentation? k-means?

Where does equation 1 come from? Is it the empirical parameter k universally valid? If not, how can the authors trust their outcomes during the whole experiments, where the armouring is developing with time? I ask the authors to compare this equation with the physically/statistically based conversion formula proposed by others (such as Fraccarollo and Marion, JHE, 1995). This may be done on their own data, or on data from the others, or on invented data (starting from the F_{ai}). What here concerned is important, as the use of equation 1 is crucial and it is not well substantiated.

The authors got images only from above, in a central and a side area. Did they compare data from the two areas in the same experiment? Concerning figure 18 , why did not the authors take and analyze any side view picture? In such a way it could be possible to get the whole process at once and to assess their results (from top image) only using areal data.

The authors, at pag. 992, found that “we find that the areal fraction content of fines derived by mage analysis is somewhat larger than the corresponding volume fraction content based on sieve analysis” and then attribute this outcome to “errors”. I find this inappropriate and inconsistent with what previously reported at pag 976: “It is worth noticing that particularly in the case of determining the grain size distribution of the bed surface the results of the areal sampling techniques (e.g., wax or clay sampling, image analysis) are not equivalent to the outcomes of sieving.”. I agree with the sentence at pag. 976, and therefore find misleading the sentence at pag. 992. Some of the reported “errors”, such those relevant to (a) and (b), are really errors. But (c) and (d) address the intimate reasons for the need of a conversion formula and of the results of

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previous papers.

Is the sampling performed by the vacuum cleaner, which removes 1 cm of sediment layer, truly volumetric for all the grainsize fraction? I am not sure about, and this is a fundamental question, as in the paper it is implied that the sampling is volumetric and the results are assumed as reference for the conversion assessment.

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

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1, C523–C525, 2014

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