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Earth Surface Dynamics Discussions

Interactive comment on "Armor breakup and reformation in a degradational laboratory experiment: detailed measurements of spatial and temporal changes of the bed surface texture" *by* C. Orru et al.

Anonymous Referee #2

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Review of Âń Armor breakup and reformation in a degradational laboratory experiment: detailed measurements of spatial and temporal changes of the bed surface texture" by Clara Orrú, Astrid Blom, and Wim S. J. Uijttewaal

GENERAL COMMENT

This paper presents the results of an armor breakup experiment, under condition of low sediment supply and changing hydraulics. The topic is of interest because armor is present and controls the morphodynamics in many rivers, and because the physics of armoring is complex and still largely misunderstood. Flume experiment is a good

way to approach the processes involved.

Before reviewing the paper, I had a look to the online discussion. I agree with referee 1 that the paper suffers from a series of drawbacks and can largely be improved. However I will not be as severe as he was, and I consider that it is a nice experiment which results deserve to be presented to the community, after major revision of the paper. Major comments My main comments concern the experimental set-up. When reading the paper the first time, I wondered if I missed something when I discovered the experimental set-up: why do you need a gravel sand transition for studying the armor breakup and reformation? This is an enigma. You could have done the same experiment without the sandy part of the flume? Or maybe this was motivated by a particular reason, but it is not explained in the paper. Actually your experiment is far to be out of interest, but what you studied seems more to be a gravel sand transition. This is a situation present in many rivers, which physics is also poorly understood. With your experiment you could describe precisely how the coexistence of armor and sand patches behave during flood: starvation and erosion of the sandy place, replacement by the gravel wave, impact of reduced slope in the propagation of the gravel wave and armor reformation. . .. Such experiment allows very well documented measurements, and we would expect a very fine analysis of the hydraulics. What were the hydraulics conditions: flow depth, velocity, energy slope, Fr, Shear stress, Shields stress. . .? Was there any side wall effects, and if yes can you propose a correction? The results you present in the paper are essentially descriptive. With the hydraulics, you could propose a much convincing quantitative analysis of your results, with a focus on what happens in the sand gravel transition zone. It would be very interesting. To conclude on this comment: either you justify the need of a sandy section for studying the armor breakup and reformation, of you reconsider the paper objective (which also means to reconsider the literature review). I also found a bit frustrating the description of the grain size measurement technique1.

SPECIFIC COMMENTS

P3 L3: how did you choose the flow conditions? P3 L15: I don't really understand what you mean by patches. Did you consider different grain size in each patch or did you use a trimodal mixture everywhere? P3 L16: I suppose that the energy slope was very different than the bed slope? P3 L19: could explain with a few lines? P3 L25-38: this part is very frustrating. A very nice equipment is presented in Fig4 but you don't really explain what it is. The method is not explained. What are these polygons? P4 L8-16: this aspect is particularly interesting. I don't know many papers describing in detail this situation. P4 L20-25 The armor breakup seems to concern the center of the flume? An evaluation of side wall effects would be interesting here. P5 L5-15: you should use the hydraulics (shear stress) to analyze these changes. Did you observe any regressive erosion at the gravel sand transition? P5 L16-28 This is an interesting result which deserves more comments

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