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Interactive comment on "Evidence of, and a Proposed Explanation for, Bimodal Transport States in Alluvial Rivers" *by* Kieran B. J. Dunne and Douglas J. Jerolmack

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p.1,l.17-19: I find Tal and Paola (2007) to be a key reference for meandering vs. braiding when involving vegetaion; perhaps it is just not cited due to the many others here, but I suggest that you read it if you haven't!

We do cite Tal and Paola 2007.

Equation 1: Consider splitting onto 3 rows for better readability

Printer-friendly version

Discussion paper

Done

p.2,l.1: remove indent

Done

Fig. 1: Why does this schematic have to have different bed and bank material? In particular, your statement that the center of the channel is only slightly in excess of critical Shields stress indicates that it is more likely all gravel that you are trying to illustrate. Do you intend to use this for both the gravel-bed and sand-bed channel examples? If so, just a little bit of clarification/generalization will be needed. (As a graphic, this is an excellent block illustration/generalization of the Parker (1978) line drawing, by the way, and one that I'd like to borrow for lectures.)

This is meant to illustrate a sand-bedded river. we have added clarification.

p.3,l.1: Parker (1978a) predicted... (no need for "Parker's model")

Done

p.3, l.22-24. Note also that Pfeiffer et al. (2017) demonstrate that gravel-bed rivers are significantly above the threshold of motion in rapidly-uplifting settings. They argue that this is due to armoring, though I have my own ideas about this (as-of-yet unpublished, and therefore nothing that you'll have to tangle with in a review). We, and others, have attempted to replicate the results of the Pfeiffer et al. paper with no success. Their

results of their work are dependent upon the biases implicit in the assumption of slope-dependent critical shields stress. As their results cannot be replicated under more rigorous testing, we will not use that paper as a reference. See comments above to the Editor on this.

p.3,l.24: remove comma after "slope"

Done

Fig. 2: Show legend in only one panel to not overlap with data

Done

Fig. 3: It looks in the figure like you have one point from seepage channels and one from experiments. Therefore, I suggest that you reword "River channels ..." to take into account that this is not quite so plural, and is not tested to be generalizable.

The single, larger points are meant to illustrate the mean of multiple measurements taken along a single longitudinal profile or multiple runs in a laboratory setup.

p.8,l5-6: Which site-specific variations are you considering, and how/why are they important?

The term "site-specific" was meant to refer to the grain size and slope. We merely

wanted to state that there are multiple ways of estimating critical.

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p.11,l.1-3: Could you discuss other reasons for cohesion? Interlocking grains and capillary forces come to mind. Are these significant compared to the surface charge effects

Capillary forces would not be a factor because the bank toe is perennially saturated. We hypothesize that part of the reason for the huge range in bank critical shear stresses from previous work is because previous studies sampled from a variety of locations up the bank, which would then incorporate capillary forces despite those not having an effect at the bank toe. We do not believe that the interlocking of grains is a significant cohesive factor because grain interlocking would happen in both cohesive and non-cohesive settings, however we see that for non-cohesive systems rivers adjust themselves to the threshold of motion. Perhaps grain interlocking is implicitly accounted for in this clustering around the threshold of motion.

p.11,l.3: material; –> material:

Done

p.11,l.31-32: Would you like to discuss some of the reasons for the low frequency of channels with 1-10 mm grain size? In particular, do you think that this may have to do with the crystal size / granule break-down problem, or possibly be connected to the transition between cohesion-dominated banks and particle-weight dominated banks that makes these grains either difficult to move or whisked away in a larger-clast gravel-bed river? This is of course ignoring arguments for equal mobility...

While this is indeed an interesting question, we do not believe the grain size gap found in channels is of particular relevance to this paper.

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