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Earth Surface Dynamics Discussions

Interactive comment on "Multiple knickpoints in an alluvial river generated by a single instantaneous drop in base level: experimental investigation" *by* A. Cantelli and T. Muto

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The authors present a set of experiments aimed to demonstrate the generation and behavior of multiple knickpoints under Froude-supercritical flow conditions over a non-cohesive bed. The manuscript is generally well-written, concise, and well-organized. I suspect that it will be of interest to scientists in fields of sedimentology and surface processes and has the potential to be well cited. The quality of the experiments and the manner in which they are presented is great. Although experiments of cyclic steps are not new, the application/interpretation as knickpoints is novel and an interesting direction. Overall, I suspect that the manuscript could be well-cited, and I support

publication, but I would like to see an expanded discussion.

The broader implications from these experiments are summarized in the concluding paragraph. In essence the authors argue that these experiments are evidence that one possible response to base-level lowering in alluvial rivers could be generation of multiple knickpoints. Because the mode of generation of knickpoints in these experiments was from the creation of cyclic steps, a bed phase that is limited to upper flow regimes, it is the authors' challenge to document natural systems in which this might occur. Seemingly, very few (if any) alluvial rivers achieve and maintain upper flow regime conditions long enough for this mechanism to be important to the long-term evolution of their beds and profiles. However, submarine channel systems generated by turbidity currents appear to be often near Froude-critical conditions. Although these experiments are explicitly subaerial flows (not sediment-gravity flows), the Froude conditions might be more important than the details of the upper interface of the flowing fluid for constraining the behavior and evolution of the bed. I would like to see a greater discussion of both of these issues in the final version of this manuscript.

A few smaller comments:

-Figure 3 is just great!

-I agree with reviewer W. Kim, that a desciption of the hydraulic/morphodynaimc conditions leading to multiple knickpoints would be greatly beneficial (though not required).

-The thoughts of the authors about what questions these experiments raise would likely be of great interest to the reader (pertaining to e.g. our understanding of cyclic steps, or migrating a non-cohesive knickpoint through changing flow conditions).

-pg 491 ln 24: What are "...permanent trains of knickpoints" in this context?

-After publication, please consider publicizing these experiments and data on the newly created Sediment Experimentalist Network online Knowledge Base!