Earth Surf. Dynam. Discuss., 1, C336–C337, 2013
www.earth-surf-dynam-discuss.net/1/C336/2013/

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

W. Kim (Referee)

delta@jsg.utexas.edu

Received and published: 27 November 2013

The manuscript presents a flume study about multiple knickpoint migrations generated by a base level drop. The paper is beautifully written including detailed descriptions about the experimental flume setup and experimental results. However, the current discussion section can be improved with a more in-depth discussion on application of the insight gained from the study. The observation of multiple knickpoints that are sustained for a long period of time without significant dissipation is clear in the text. However, it would be great for the paper to take one more step by answering hydrodynamically why the system responds to the forcing in this way.

Here are some suggestions that might improve the points above: 1. Depths of the knickpoints compared to channel depth and/or base-level drop would be great addition to the manuscript. 2. Scale base-level drop using channel depth: Even though this is not perfect, this provides a useful approximation of experimental base-level drop in the field scale. 3. Calculate basin equilibrium timescale for each experiment and compare with travel time of the knickpoints. A recent paper (Shen et al. 2012) published by a team in Tulane reported a rapid response in the Lower Mississippi River to sea level forcing. Terrace formation after a sea-level fall in the Mississippi River basin extended to 600 km upstream within 10 ky, which they think happened over a very short time compared to the basin response time which they calculated based on the diffusion equation. The current study (even though the flow is supercritical in the experiment) clearly demonstrates how the system responds to a base-level fall, generates multiple knickpoints, and reaches a new equilibrium, and also show time fraction of individual knickpoint migration relative to the basin equilibrium timescale.

Minor comments: L9, p485: need more description about "self-preserving state" L17, p487: at particular values (Table 1) L25, p487: The RGB values of L28, p487: (Fig. 1b and 1c) L5, p489: slope first became steeper L6, p489: then became gentler L18, p489: downstream from the feed point L11, p490: Figure 3 L28, p490: ranging from, add Qs/Qw ratios Figure 3: vertical axis label, Downstream distance from the sediment. . .

Shen, Z., Törnqvist, T.E., Autin, W.J., Mateo, Z.R.P., Straub, K.M., and Mauz, B., 2012, Rapid and widespread response of the Lower Mississippi River to eustatic forcing during the last glacial-interglacial cycle: Geo- logical Society of America Bulletin, v. 124, no. 5–6, p. 690–704, doi:10.1130/B30449.1.

Interactive comment on Earth Surf. Dynam. Discuss., 1, 483, 2013.