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Earth Surface Dynamics Discussions

Interactive comment on "A reduced-complexity model for river delta formation – Part 1: Modeling deltas with channel dynamics" *by* M. Liang et al.

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The authors here present the background and some general results from a new model of river-dominated delta evolution. The description of the model components is well presented and there is sufficient detail that the research can be understood and the model reasonable reproduced from the description. The authors then present a few test cases where the model results are, for the most part, compared to other model and lab results. These results show that the DeltaRCM model can reproduce many general features seen in these other test cases. There is also a brief comparison some features of the Wax Lake delta system. Overall, this paper serves a useful role as a description of the model components and a broad demonstration of its capabilities.

I have similar thoughts as other reviewers that the model appears to have a number

of specifically unconstrained and heuristic parameters that are essential in the model behavior. This is fine, but it would be nice to have a table to summarize these unconstrained parameters and the values that are used in simulations that are shown (not the just the input parameters as in Table 1). While the authors have made a nice presentation here of model capabilities, it would be interesting in another format or future work to see how these parameters (particularly the smoothing terms) affect model behavior. As such, here I feel that the authors leave us with an impression that the only variability in model results is from a change in the input parameters (i.e. inputs and boundary conditions). It is likely that both inputs and model parameters have strong effects on the output.

In "3. Model Construction" it would be informative if the authors could more specifically state their objectives for the construction of this model. In lines 7-8 on p. 828 there is a general scope made, but it would be nice to motivate up front the specific decisions that were made in terms of what type of reduction of nature the authors have selected and what aspects of delta evolution they specifically hope to achieve. The choice of complexity reduction is an important part of any RCM.

I am not in total agreement that the authors have fully established that the four items listed as needs in an RCM on P851 L6-10. To make these assertions, I would think the authors would present model tests to show how each of these are needed. In particular, the authors have not motivated that both bedload and suspended load transport are necessary (at least in the model results that are presented). To my knowledge, such a distinction is not apparently needed in the Seybold et al. model to capture certain essential aspects of delta evolution. Expanding upon that thought, it would be nice if the authors could more specifically address some of the process distinctions between their RCM and the one by Seybold. I'm sure there are many, but some discussion would be useful. As an extension, there are features that this model does not seem to be able to recreate, such as leveeing and birdfoot formation that have been a large discussion item in the field as of late. Perhaps the authors could address why this may

be the case. i.e. how do the simplifications only allow fan deltas?

Overall, this is interesting work and a useful addition to the literate and I am glad to see it in published form.

Regards,

Andrew Ashton - - -

Other notes:

The abstract could use some attention to wording and grammar; it is not up to the standards of the rest of this manuscript. The first line of the abstract is odd as the authors claim to essentially make a model type of model.

P846 L2. “John Shaw” is awkward. (To clarify, I am not suggesting that John Shaw is awkward, but rather that this turn of phrase is awkward.)

P846 L21. As with all good autobiographies, deltas also get to remove and rewrite parts of their history. . .

Interactive comment on Earth Surf. Dynam. Discuss., 2, 823, 2014.