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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Modeling the Glacial Lake Outburst Flood Process Chain in the Nepal Himalaya: Reassessing Imja Tsho's Hazard" *by* Jonathan M. Lala et al.

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First of all, I apologize for the delay in submitting this review.

Lala et al. present results of a study that investigates cascading processes of an avalanche-triggered GLOF. The authors report on new bathymetric data as well as a numerical simulation chain that combines the different models RAMMS and BASEMENT. Their results represent a valuable contribution to the discourse about the risks related to an outburst of Imja Tsho and provide new insights into GLOF modelling that go beyond this case study. As such, the manuscript is worth publishing and HESS is a suitable journal. Before publication, however, there are few issues that require further

work, some of which have been addressed by the first reviewer Simon Cook.

1. The manuscript is well written. I particularly like the layout of the controversy around the hazardousness of the lake to which the study contributes. However, I think that the discussion section could pick up more of this controversy. Instead, the discussion is very much software related (advantages of BASEMENT, two-phase models (r.avaflow)) which distracts from this controversy. I suggest to restructure the discussion, possibly with subheadings, to keep focus on the controversy.

2. Some of the initial conditions related to wave propagation are unclear. Is water that spills over the moraine routed across dry terrain, or is there some initial discharge in Imja Khola? How does flood hazard change if the river is already bankfull during Monsoon season? Moreover, does the DEM cover the area down to Dingboche? Was the DEM preprocessed and hydrologically corrected? In a recent study, we have shown that hydrodynamic models are quite sensitive to pits in the DEM as they become subsequently filled during flood-wave propagation (Bricker et al., Mountain Research and Development, 37, 5-15). Is it possible that the strong attenuation of the flood wave is due this issue? Moreover, what is the hydrograph volume that leaves the lake and what is its proportion to overall lake volume. Is there some incision into the moraine dam that lowers the lake or is the hydrograph volume merely the water that overtops the dam crest?

3. I think that the differences in the Heller-Hager model and the wave heights from BASEMENT should be discussed in the discussion section. The calibration of the model using the analytical Heller-Hager model seems admissible, although it is far from elegant. Can this be overcome somehow?

Specific comments:

2, 13: Remove "catastrophic". It is the chain of events and impacts that make these events catastrophic. But per se, they are not catastrophic.

5, 17: To my knowledge, Fischer et al.'s study adresses the European alps and not the Everest Region.

6, 17: Is this truely a <4 m resolution DEM, or is it a DEM with an accuracy of $\sim$4 m, as stated in the referenced paper (King et al., 2017)?

8, 19: BASEMENT

13, 21: Heller-Hager

15, 4: Debris discharge: Please clarify what you mean by this term. Sediment discharge? Or sediment and water discharge combined?

Fig 8 requires labelling (A-C) of the panels.

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