

## ***Interactive comment on “Numerical modelling of Glacial Lake Outburst Floods using physically based dam-breach models” by M. J. Westoby et al.***

**Anonymous Referee #2**

Received and published: 30 July 2014

This paper discusses a detailed modelling approach to assessing dam breaches associated with Glacial Lake Outburst Floods. I think it could be published following some moderate revisions and further clarification.

My comments are as follows. The paper is not always clearly written for the general reader and much of the discussion of the results section should be rewritten for clarification. I would also ask that the paper better identify and discuss the problem of uncertainty. What does this uncertainty affect? Where does it come from and are there intractable issues? There is much literature on uncertainty analysis in the use of climate change models for instance and reference to some of this literature should be made because many of the problems that are faced by the earth science researchers are not dissimilar to those faced by climate modellers (e.g initial condition uncertainty;

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the problems associated with ensemble modelling, model uncertainty and model variability, the uses and abuses of Bayesian modelling and distinctions between frequentist approaches). In the case of the use of Bayesian statistics (page 490), the paper needs to discuss how the prior was identified and this is not done sufficiently. I am also not sure that the use of the idea of equifinality is sufficiently described and rationalized. What does the concept add and it is being used properly? The implications of equifinality and convergence are profound for prediction, retrodiction and induction and these need better assessment. I could not see why HR BREACH model was used, nor whether it is better than other types of models. I am not a modeller so I would need a better assessment and justification of this model over other ones. Also is the 2D approximation appropriate for a 3D modelling issue such as dam breaches? It may be but this needs to be discussed in more detail. How representative is the site used for this study? In other words, how applicable to other situations is this approach? This is not adequately demonstrated, but if it was applicable and showed that the approach produced valuable information then this paper would be of value. At present you have shown that moraine material roughness and sediment characteristics play a major role in dam breach development. So, how can we use this model more widely in regions where assessing sediment character of moraines is prohibited or difficult. This question needs answering or more discussion.

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Interactive comment on Earth Surf. Dynam. Discuss., 2, 477, 2014.

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