Peer Review Report

Review Report on Suyyas's Flood: Numerical Models of Kashmir's Medieval Megaflood and ancient Lake Kerewa drainage events

Original Research, Earth Sci. Syst. Soc.

Reviewer: Paul Carling
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EVALUATION

Q 1 **Please summarize the main findings of the study.**

This study attempts to reconstruct the flood wave from a landslide dam that occurred in the Himalaya around the 9th C CE. The event was mentioned briefly in an early historical text. The dam was breached artificially. The main output of the study is a series of reconstructed hydrographs and indictors of the progression downstream. I have supplied an annotated manuscript.

Q 2 **Please highlight the limitations and strengths.**

Reconstruction of historical disaster events has merit both in term of the historic narrative but also in indicating the scale of potential threats to humanity that has occurred in the past as an indicator of the potential threats in the future. This submission has no strengths but is severely limited in all aspects of the analysis and presentation of the context and the detail of the study.

Q 3 **Please comment on the methods, results and data interpretation. If there are any objective errors, or if the conclusions are not supported, you should detail your concerns.**

There is insufficient detail defining the local context of the dam and flood environment. It is not clear if the authors have visited the location and it appears that they have not, otherwise some of the short-comings could have been addressed by detailed fieldwork. The data collection regimen is not defined. The history and timing of Lake Kerewa lake levels is evidently of possible relevance, but nothing is said about the lake other than to provide a reference. Vague statements occur throughout the manuscript and the selection of model parameter values are not justified. The plausible dimensions of the landslide dam reported are highly speculative and range extremely widely. The smallest dimension was possibly not stable (and so not plausible) and this issue could have been considered by theoretical consideration of the stability of a mass of this size. Thus the smallest dam volume is not justified and in the same vein the largest potential volume of material for the failure should be evident in the topography, but no attempt seems to have been made to identify the failure location. No details of the dam composition are reported, rather two empirical equations are used to crudely explore the breach dynamics. It is not explained why these two methods were selected when sophisticated methods are available that could be calibrated given the data that should support this project from fieldwork and theory. There is no attempt to couple a breaching model to the downstream flood model. HEC-RAS is not a suitable model to apply to highly unsteady discharges emanating from a breach. Once the breach flow was established then HEC-RAS could be used to route the flow further down the system. The flood does not seem to attenuate downstream but migrates as a kinematic wave - this behaviour should have been explained. The initial breach dimension is not specified which makes the modelling highly suspect

and impossible to evaluate thoroughly. It is not explained how the boulder sizes were defined (what scale is used to define 'megaboulders?) and how the locations of boulders were mapped is not stated. What sizes and boulder locations were not mapped, for example, is a further issue that is not explained. Rather than a force-balance model, an empirical boulder transport equation is used to calculate potential entrainment. It is not explained why this equation is appropriate and entering values into the equation (as it is written in the manuscript) does not return the same values as the authors report. Given the limitations on flood modelling, it makes sense to develop a full suite of potential outbreak scenarios and then report a range of discharge possibilities within an uncertainty analysis that allows convergence on the most likely flood - this was not done.

Q 4 Check List

Is the English language of sufficient quality?
No.

Is the quality of the figures and tables satisfactory?
Yes.

Does the reference list cover the relevant literature adequately and in an unbiased manner?
No.

Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test)
No.

If relevant, are the methods sufficiently documented to allow replication studies?
No.

Are the data underlying the study available in either the article, supplement, or deposited in a repository? (Sequence/expression data, protein/molecule characterizations, annotations, and taxonomy data are required to be deposited in public repositories prior to publication)
No.

Does the study adhere to ethical standards including ethics committee approval and consent procedure?
Not Applicable.

If relevant, have standard biosecurity and institutional safety procedures been adhered to?
Not Applicable.

Q 5 Please provide your detailed review report to the editor and authors (including any comments on the Q4 Check List):

Please see response in Q3 and the annotated manuscript supplied.

QUALITY ASSESSMENT

Q 6 Originality

Q 7	Rigor	
Q 8	Significance to the field	
Q 9	Interest to a general audience	
Q 10	Quality of the writing	
Q 11	Overall quality of the study	

REVISION LEVEL

Q 12 What is the level of revision required based on your comments:

No answer given.