

Dear Reviewer #1,

Thank you for reading and commenting our manuscript, although in most cases we do not agree with the criticism brought forward. We provide our replies point by point below. Comments and replies are shown in *italic* and **bold**, respectively.

The authors present interesting data and hypothesis on the disastrous ice avalanche event triggered by the Gorkah earthquake in the Langtang valley.

However the paper mixes up facts measured by different methods (weather stations, photogrammetric DSMs, statistics) with quite bold hypothesis on the process which are not underlay sufficiently by facts and measurements. The authors have to state clearly which statements are based on facts and which statements are hypothesis or guesses. Right now these two types of statements are dangerously mixed up.

[reply] We clearly distinguish observational facts from speculations. We describe the observed facts (DEMs and their differences, move of the Cheese boulder, diameter of fallen trees, and so on) in the results sections and rather speculative issues in the discussion sections. Although the estimate of ignition speed for the "Cheese boulder" is based on multiple assumptions, we have included it in the results sections. We clearly describe how we estimate ignition speed using a range of plausible scenarios (P6L15).

I do not agree on the hypothesis of the avalanche with only marginal contribution of glacier ice. The letter by Lacroix (2016), which is cited by the authors, clearly shows that considerable mass of up to 30 m thickness detached close to the ridge at several locations. This must be glacier ice and cannot be snow (estimated snow thickness 1.5 m). So the major part of the mass have to come from glacier ice. The whole part on the triggering and the dynamics of the event is very weak. Based on the presented data no sound standing explanation of the triggering and dynamics of the event is possible. The authors should therefore delete or at least substantially reduce this part and declare it as hypothesis.

[reply] We clearly describe that the elevation difference between two DEMs estimated by Lacroix (2016) is reliable (P9L13). But we further describe in detail (P9L13-) that the use of an initial image taken in April 2014 is problematic. During one year, which includes the summer monsoon season of 2014, the glacier surface is likely to have changed significantly by melting, accumulation and glacier flow. We emphasize

therefore that the difference of the DEMs with one year in between is NOT equivalent to "the detached ice".

Moreover, the reviewer seems to suggest that because the detached ice is thicker (30m) than the snow pack (1.5 meter), most mass must be ice. As we have shown with our volume estimates this is obviously not true, because the snow covered area (8.73 km², P9L31) is much larger than the area of detached ice (< 0.5 km², which is a rough but with ArcGIS estimate by us because the area is not provided in Lacroix (2016)).

As far as I know David Breashears also scoured high resolution photographs of the upper part of the area. Why are these photographs not used to generate a DSM?

[reply] We appreciate this suggestion. We have generated an orthomosaic for the upper part from photographs taken by David Breashears. However, the quality of the orthomosaic is not sufficient to investigate the avalanche source area above 6000 m a.s.l. though topographic feature around glacier terminus around 5000 m a.s.l. is clear. We suppose that this insufficient quality is due to 1) upward viewing angle of the photographs out of a helicopter and 2) less contrast on snow covered areas, which is a common issue on remotely sensed DEM creation. We will add some descriptions for this problem in the revised manuscript.

Also the story about the Chees Boulder is very vague. I agree that it is very interesting but I do not think that the facts are sound enough to include it into a scientific publication.

[reply] As we described in the discussion paper, this is not only an interesting story but additional evidence that constrains estimates of speed and energy of the avalanche. Assumptions and limitations of this evidence are discussed in the manuscript.

In my opinion parts of the presented data is interesting. However in the presented form the paper is not acceptable for publication in a scientific journal and has to be carefully overworked by clearly dividing measured facts and reducing speculations not supported by sufficient measurements or observations.

[reply] The Langtang disaster represents a significant geophysical event with tremendous human consequences. Our analysis combines measured facts and interpretation, and is thus similar to other hazard studies. This particular review comment does not provide any specific details on how the manuscript should be improved, and so we have no particular response to add.