Dear Dr. Martin Mergili,

thank you very much for your valuable and constructive comments and suggestions. We agree with most of them (see our responses below). We believe that they will help to improve overall quality of the manuscript.

General comments

"My major concern consists in the fact that the method is called "objective". I have to emphasize that I like the approach with the indices between 0 and 1 for different possible triggers of GLOFs. However, I would be careful in calling it "objective". The equations, even though leading to continuous results on a numeric scale, are driven by the experience of the authors and do not directly employ deterministic or statistical relationships – since the method uses quantifiable parameters, it can be characterized as "reproducible", but it is not objective in a strict sense."

Response: The term „objective" was perhaps a little bit inappropriately used to described the fact, that presented method should provide identical results for different assessors in case of the same input data. Construction of the method is not fully objective, as indicated also in the second review by anonymous reviewer. Thus, we will eliminate usage of this term in the next version of the manuscript.

"I recommend to introduce abbreviations for each of the five trigger mechanisms at the very beginning – this would make the further text better readable and avoid frequently repeating the very lengthy names of the trigger mechanisms."

Response: Abbreviations will be used in the next version of the manuscript.

"Further, the use of terms such as "potential hazard", "potential hazardousness" etc. is not necessary since a hazard is a potential. Therefore just use the terms "hazard" or maybe even better "susceptibility" or "hazard indicator" (the method does not yield a hazard in the strict sense)."

Response: the term "hazard" is defined as probability, that particular threat will occur. Presented method do not calculate probability, thus term "hazard" can not be used. Therefore we decided to use „potential hazardousness", which we understand in the context of GLOFs as a „possibility of a sudden release of water following glacial lake dam failure or overtopping".

"The text is well-structured and the tables and figures are informative and well-designed. Even though most of the manuscript is well understandable, English grammar and style require some improvement. I have addressed the most important issues (but not everything) in the specific comments."

Response: English in whole manuscript was corrected by natural born speaker. We will arrange another language revision for the final version of the manuscript.

Specific comments:

2392, 10: "have yet to be used before": I do not understand – have they be used before or not?
- this phrase will be replaced through the whole text

2393, 6ff: GLOFs are introduced as fluvial processes – even though this is certainly not wrong, at least a few words should be dedicated to the possibility of entrainment of sediment and the possible conversion of floods to powerful mud or debris flows.
- This information will be added into the next version of the manuscript

2395, 24: "We have the following reasons for this study": Better write something like: "The objectives of the present study are: "
- Accepted

2395, 24: Please cite some of your work in the Cordillera Blanca.
- citation "Emmer and Vilímek, 2013" will be added into the next version of the manuscript

2396, 14: "which were consider": Please correct the grammar.
- Accepted

2396, 26: "allows".
- Accepted

2397, 13f: "point-based methods". Further, please shortly explain the main characteristics of the methods listed.
- "point-based method" - this type of method is based on counting of points indicating increased hazardousness (e.g. Reynolds, 2003; Huggel et al., 2002; Mergili and Schneider, 2011)
- "calculation-based method" - based on defined calculation, where selected variables are substituted (e.g. McKillop and Clague, 2007; Wang et al., 2011)
- "decision tree-based method" - „if something, then something" (presented method)
- "matrix-based methods" - usually used in combination, e.g. with point-based method; overall hazard is derived from two or more components based on specific matrix (Mergili and Schneider, 2011)
- This will be added into the next version of the manuscript

2397, 24: "dynamic slope movements": do also static slope movements exist?
- replaced by "fast slope movements" within whole manuscript

2399, 22: "strong earthquake".
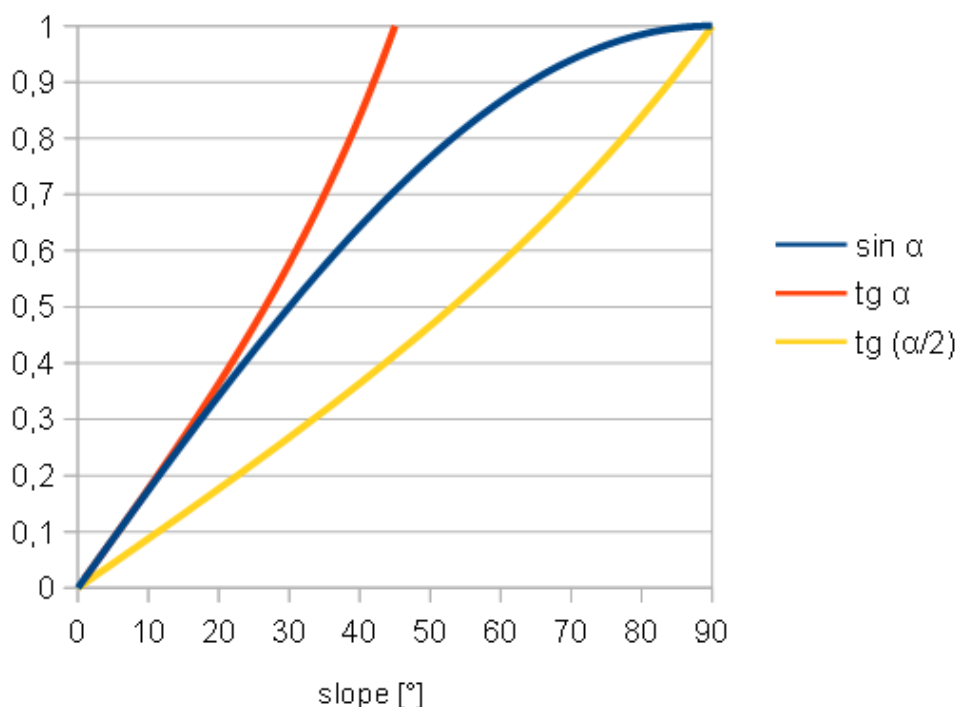
　- Accepted

2401, 7: "If the lake"

　- Accepted

2401, Eqs. 2 and 3: Why do you use the sinus of the slopes? From a geotechnical viewpoint, the tangent would be more appropriate as – at least for cohesionless materials – the safety factor is tan phi /tan slope.

　- for our purpose of simplified description of susceptibility of moraine slopes to slope movements (not based on geotechnical viewpoint), we believe, it is more important to stress rapidly increasing susceptibility between slopes 0-60°, than between 60-90°, because moraine slopes steeper than cca 70° frequently failed and it is not necessary to distinct between slopes 70-90° significantly

　- sin α in comparison with tan (α/2) provides higher results for the same slopes (see Figure 1), therefore we decided rather to use sin α; tan α cannot be used (because exceeds 1 for α>45°) or tan (α/2)

　Figure 1: Comparison between sin α, tan α and tan (α/2)

2403, 14: Better: "lakes at high elevation".

　- Accepted

2403, 16: "large lakes" would be better instead of "great lakes".

　- Accepted

2404, 27: "In these cases".

    - Accepted

2405, Eq. 8: This is not objective (see also general comment above)!

    - Agree (see above)

2406, 2: "digital terrain model".

    - Accepted

2406, Eq. 10: Also here, the tangent might be more "objective" than the sinus.

    - see above shown explanation for use of sinus

2406, 23ff: The maximum slope often depends very much on the raster cell size used, so please be careful in applying it.

    - Definitely agree, therefore we recommend use of comprehensive and uniform input data, if possible (Discussion, sectiopn 4.2)

2407, 3: "into account".

    - Accepted

2407, 5ff: An additional criterion would be the retention capacity between the upstream and the downstream lake (e.g., a floodplain where a flood wave could be alleviated) – please justify why you did not take this aspect into account.

    - Generally, retention capacity is hardly quantified and meaningful calculation requires complex assessment procedure, where detailed terrain models as well as information about material of valley floor and type and density of vegetation cover should be included. In most cases, the valley floors in Cordillera Blanca between two consecutive lakes are made of solid bedrock with steep gradient and retention capacity between these lakes is close to zero; therefore we decided to skip retention capacity, even if some result of potential hazardousness of downstream situated lake may be overrated (part of escaped water may be retained in the valley)

    - this will be also added into the discussion, part 4.2 Potential sources of errors

2408, 5: Better: "seismically most active regions".

    - Accepted

2408, 20f: "strong earthquake".

    - Accepted

2409, Eqs. 14 and 15: Doubling gamma and applying the square of rDH, respectively, are far away from "objective" approaches, even though they are reproducible (see general comment above).

- Accepted, this is not objective construction procedure (see answer to general comment above)

2410, 10: "It is always highly important".
- Accepted

2410, 17: "lakes which have yet to produce GLOFs": please avoid this phrase here and in all other places where it is used. A lake does not have to produce a GLOF. Better just write "lakes which have not yet produced GLOFs".
- Accepted

2411, 10: I suppose that "Autoridad" would be correct Spanish instead of "Authoridad".
- Accepted

2411, 25: I suppose the potential is always "higher or equal" instead of "higher"?
- Accepted

2412, 23: "produced a GLOF in 1941".
- Accepted

2413, 10f: I am not so familiar with the details of the Laguna 513 Event, but as far as I know, it occurred in 2010 and there was certainly awareness of the hazard as the lake level had been lowered artificially – please check with the literature.
- Yes, lake level of Lagune 513 was lowered artificialy for about 20 m by arificial tunnels through the bedrock dam, because the lake was considered hazardous. After that, lake was considered safe, nevertheless 2010 GLOF occurred then.

2414, 14: Better: "has to be considered" instead of "is unfortunately taken into consideration".
- Accepted

2415, 1-3: Please reformulate this sentence, it is not understandable.
- "In case of Scenarios 2 and 4, resulted potential hazardousness should be interpreted with regard to the most likely scenario of GLOF from the lake situated upstream"

2415, 11: "which were recorded in the study region".
- Accepted

2416, 2f: "including the presented one, and represents a potential source ...".
- Accepted

2416, 8: "and uniform input data, if possible".
- Accepted

2416, 9: Better write "Advantages and disadvantages" or "Potentials and limitations".

    - Accepted

2416, 13f: This is reproducibility, but not "objectivity".

    - Accepted

2416, 20: Not understandable, please reformulate.

    - "compromise between demands on input data on one side and repeatability and the relevance of the obtained results on the other side"

2417, 2: Better remove "fluvial" – in some cases, GLOFs may be transitional between fluvial and gravitational.

    - Accepted

2417, 6: What is a spatial-effective mitigation tool?

    - replaced by "effective mitigation tool"

2417, 15: "for identifying the most hazardous lake(s)".

    - Accepted

Table 1: Again the term "objective": I would not describe my own schemes as fully "objective", rather as "reproducible".

    - Accepted

Captions of Figures 7-11: "The results for particular lakes".

    - Accepted

Best regards

Adam Emmer, Vít Vilímek,

email: aemmer@seznam.cz, vit.vilimek@natur.cuni.cz

Charles University in Prague, Faculty of Science,

Department of Physical Geography adn Geoecology,

Albertov 6, 128 43, Prague 2, Czech Republic