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IDENTIFICATION OF POTENTIAL FUTURE LAKES AND ASSOCIATED HAZARDS IN THE MONT BLANC MASSIF

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In the current context of deglaciation (*i.e.*; permafrost degradation and glacier retreat) new landscapes of rock, debris and lakes are forming, and hazards are increasing, with possible chain-reactions processes such as rock falls into lakes, triggering impact waves and debris flows. This study identifies glacier-bed overdeepenings (GBO) using the GlabTop model (*Glacier-Bed Topography*; Linsbauer *et al.*, 2012) in the Mont Blanc massif as locations of potential future lakes. The plausibility of a lake to form in these predicted GBO is then analyzed based on four morphometric criteria defined by Frey *et al.* (2010). GlabTop output are evaluated against GPR measurements and recently formed lakes at retreated glacier snouts. In addition, the susceptibility of these lakes to be impacted by a rock fall is determined using the RAID model (*Rock-Avalanche Impact Susceptibility*, Schaub *et al.*, 2015), which considers topographical parameters, debuttressing effect and permafrost occurrence. In total, 22/33 lakes > 1ha analyzed in this study are highly or very highly plausible. Among them, 10 have relatively high chances to be impacted by a rock fall. This investigation at the regional scale provides relevant information to identify possible “hot spots”, pointing out areas that can be affected by high-magnitude hazards where detailed investigations at the local scale would be relevant to anticipate and eventually mitigate the associated risks.

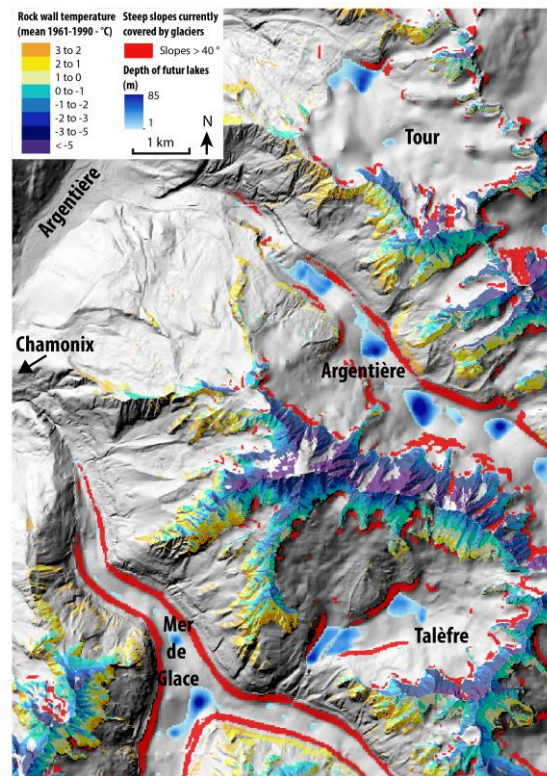


Figure 1. Example of potential future lakes identified with GlabTop and parameters to assess rock fall favorability.

REFERENCES

- Frey, H., Haeberli, W., Linsbauer, A., Huggel, C. and Paul, F.: A multi-level strategy for anticipating future glacier lake formation and associated hazard potentials, *Natural Hazards and Earth System Sciences*, 10(2), 339–352, doi:<https://doi.org/10.5194/nhess-10-339-2010>, 2010.
- Linsbauer, A., Paul, F. and Haeberli, W.: Modeling glacier thickness distribution and bed topography over entire mountain ranges with GlabTop: Application of a fast and robust approach, *Journal of Geophysical Research: Earth Surface*, 117(F3), doi:10.1029/2011JF002313, 2012.
- Schaub, Y. Outburst Floods from High-Mountain lakes: Risk Analysis of Cascading processes under Present and Future Conditions, PhD thesis, University of Zurich, pp. 293, 2015