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# Reconstruction of the sudden drainage of a moraine-dammed lake in the Cordillera Vilcabamba (Peru): the 2020 Salkantay event

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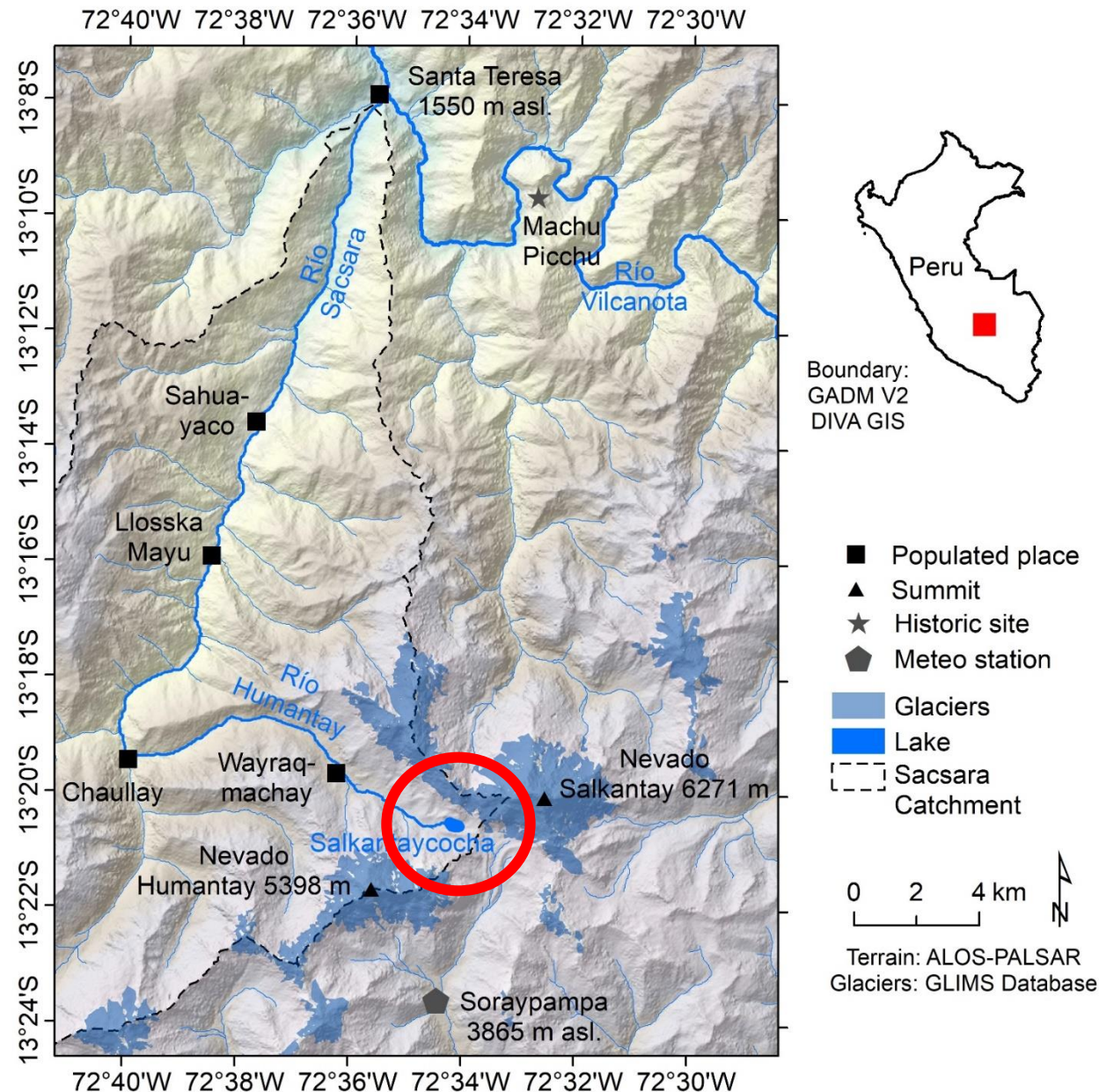
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**Located** at the head of the basin, Lake Salkantaycocha is the source of the Humantay River. It then reaches the main Vilcanota River near the town of Santa Teresa in Cusco, Peru.

On 23<sup>rd</sup> February 2020, a landslide-triggered GLOF (Glacier Lake Outburst Flood) process chain was initiated from the SW slope of Nevado Salkantay, Cordillera Vilcabamba, Peru.

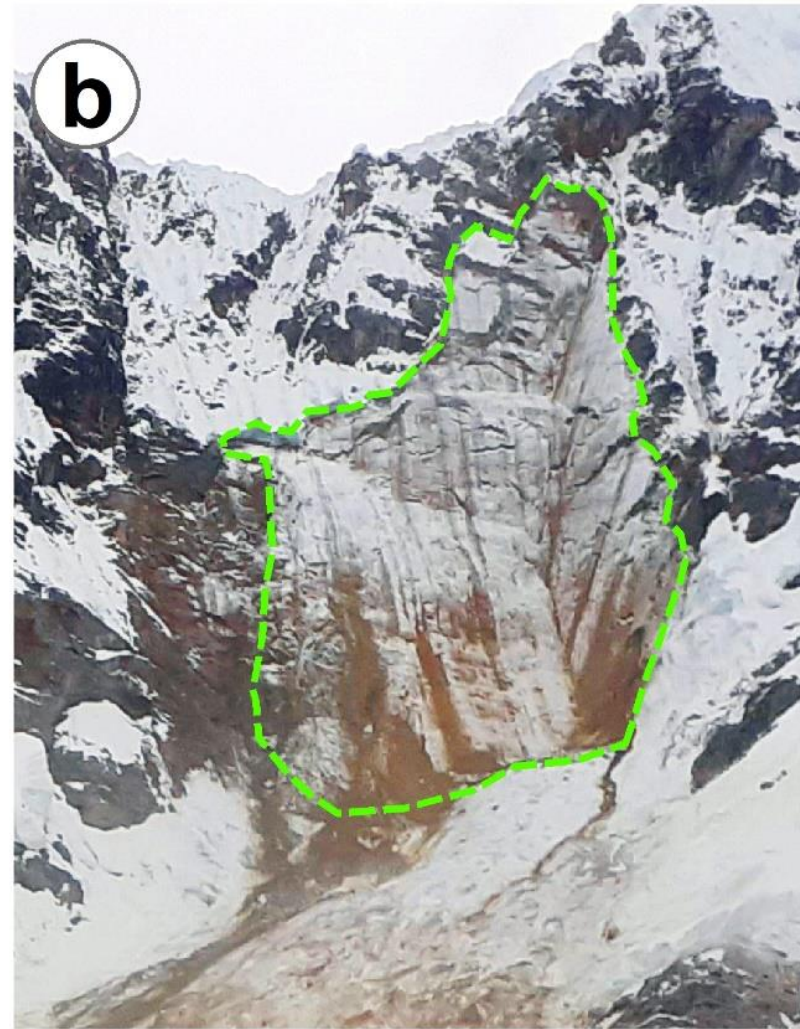
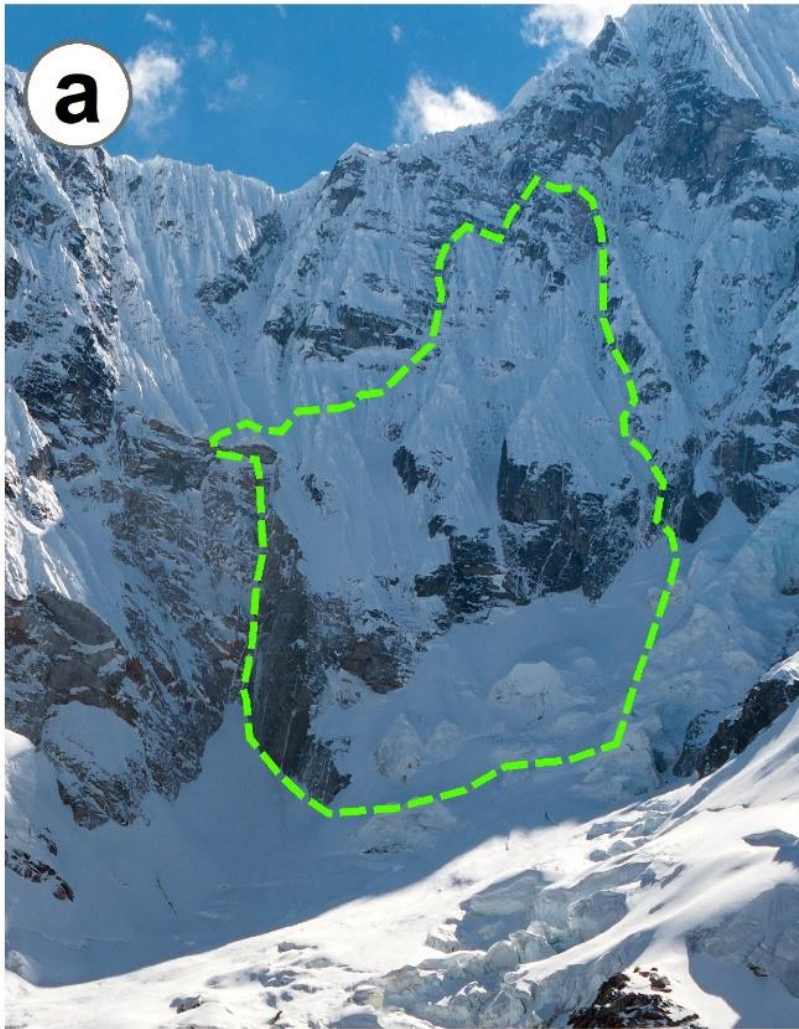


An initial slide evolved into a rock/ice avalanche and part of the released material fell into the moraine-dammed Lake Salkantaycocha, triggering a displacement wave which overtopped and eroded the distal face of the dam.



Dam overtopping resulted in a far-reaching GLOF causing fatalities and also people missing in the valley located downstream.

In this contribution, we analyse the situation before and after the event as well as the dynamics of the GLOF process chain, based on field investigations, remotely sensed data, meteorological data, and a computer simulation.

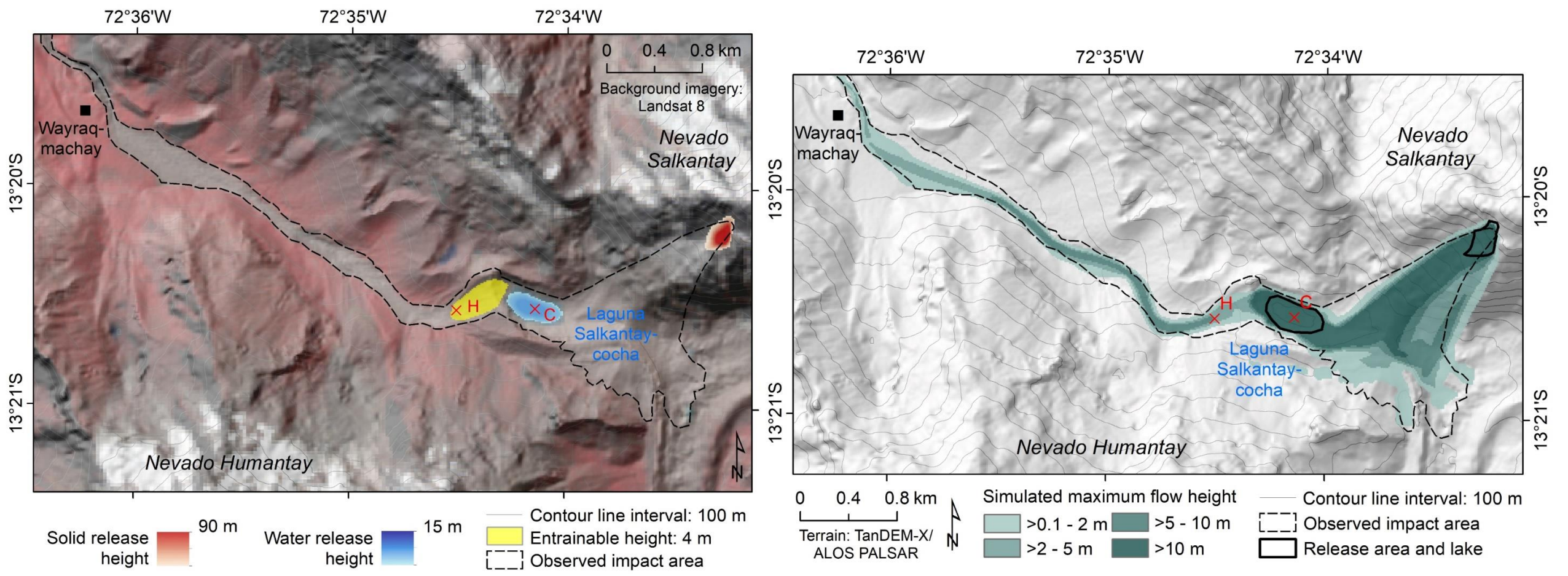


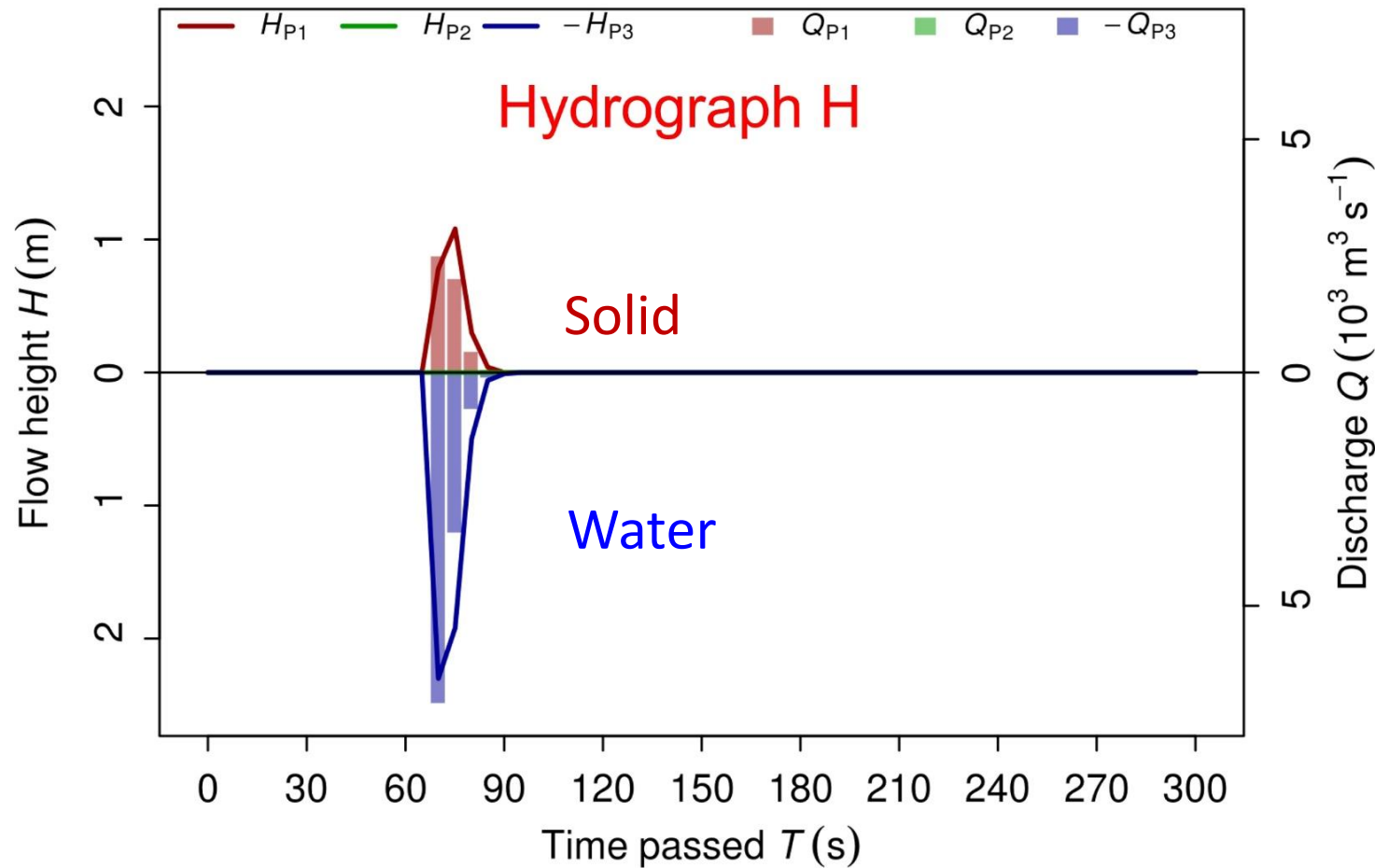
Comparing pre- and post-event field photographs helped us to estimate the initial landslide volume of 1–2 million m<sup>3</sup>.

Release zone of the rock/ice avalanche a before and b after the event. Panel **a** was taken on 3 September 2018, © Wen Jie Zhou, whereas panel **b** was taken on 25 February 2020 by Benito Moncada

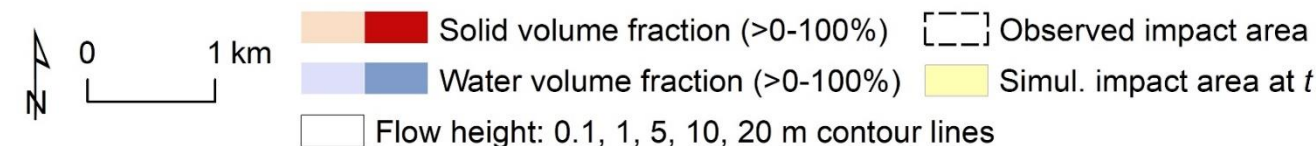
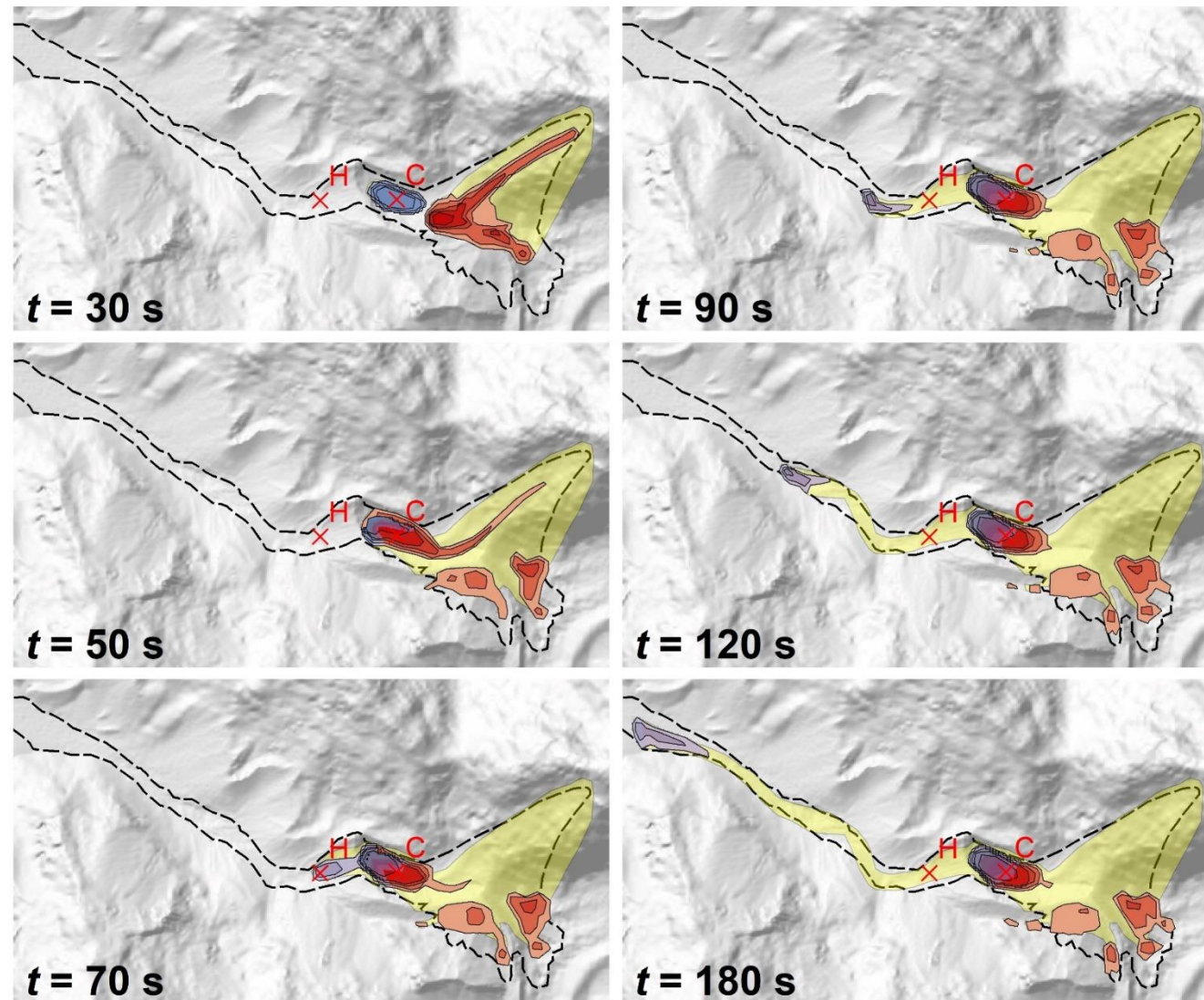
# Process chain simulation using r.avaflow

The simulation reveals that the landslide into the lake created a displacement wave of 27 m height.

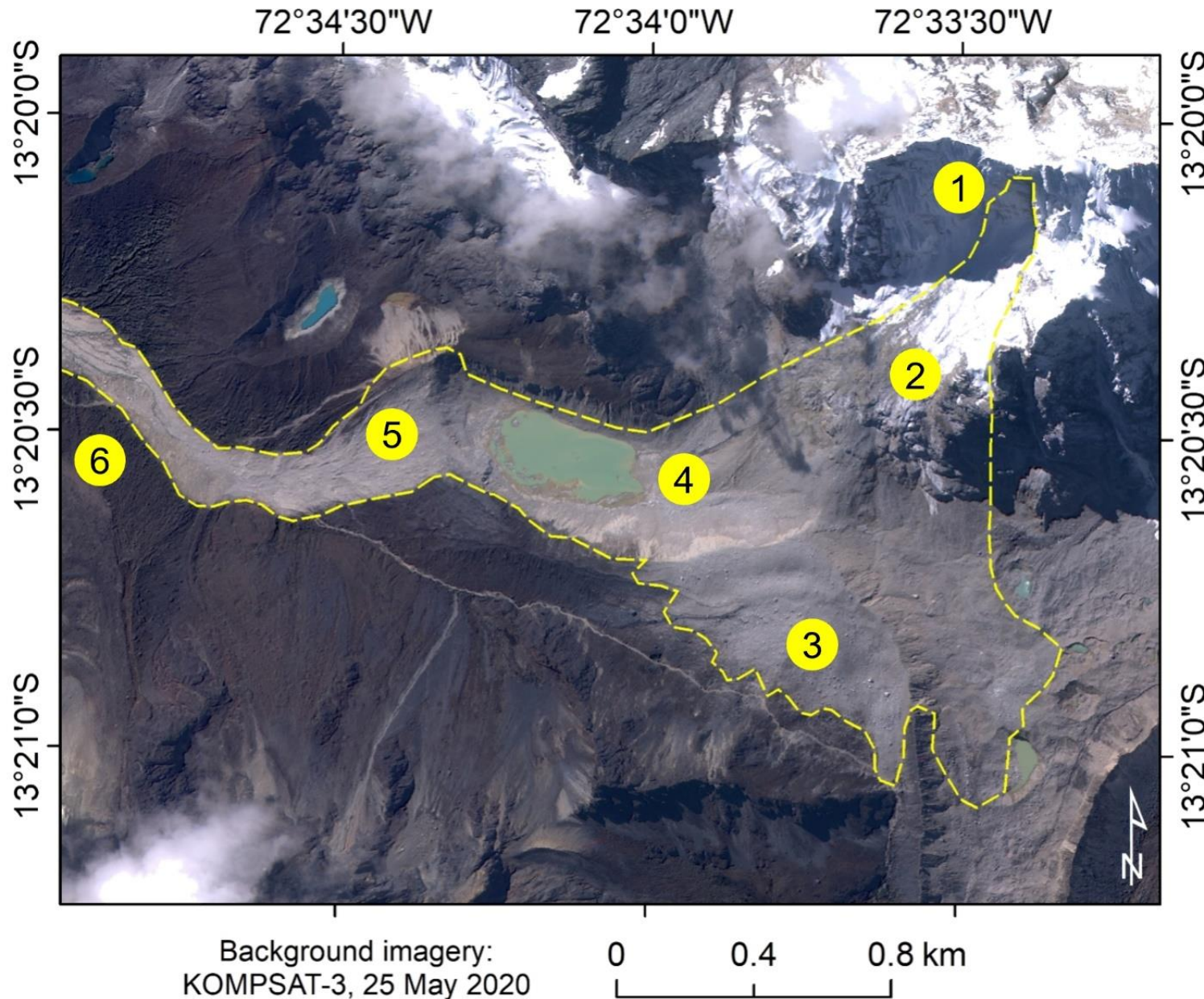




We reconstructed a released volume  $57,000 \text{ m}^3$  (less than 10% of lake volume) and estimated a total GLOF peak discharge almost  $10,000 \text{ m}^3/\text{s}$  at the dam.



The lake had 40 m dam freeboard at the time of a GLOF, and the lake level increased by 10–15 m directly after the event, since most of the volume of landslide material deposited in the lake (roughly 1.3 million m<sup>3</sup>).



The model results show a good fit with the observations, including the travel time to the uppermost village. The findings of this study serve as a contribution to the understanding of landslide-triggered GLOFs in changing high-mountain regions.

Thank you!