Causes, consequences and implications of the 2023 landslide-induced Lake Rasac GLOF, Cordillera Huayhuash, Peru

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Supplementary figures:

Selected climate variables, averaged over the 1° by 1° box [-77.5, -76.5, -10.75, -9.75] covering Rasac, showing their seasonal cycles and historical trends.
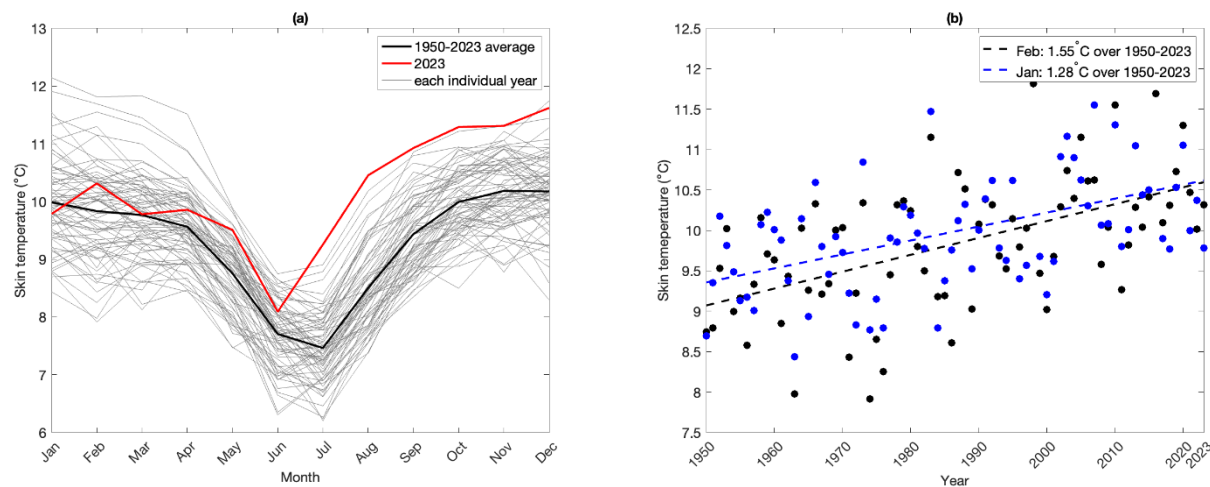
Figure S1. Seasonal cycle of surface skin temperature (°C) for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant warming trend over the period analysed here.
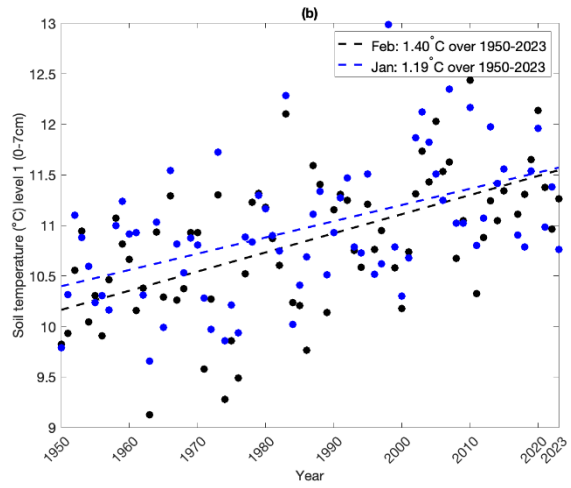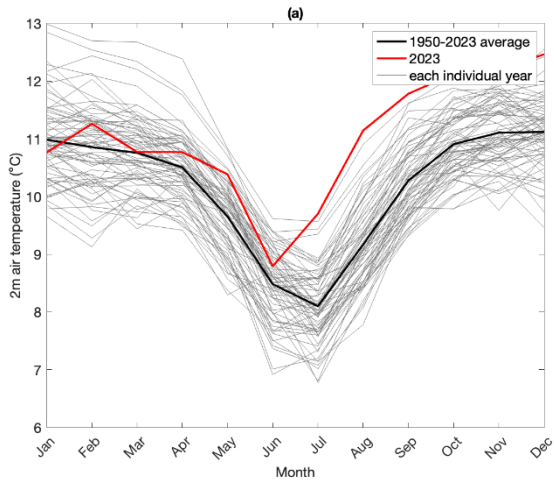
Figure S2. Seasonal cycle of soil temperature (°C) in layer 1 for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant warming trend over the period analysed here.

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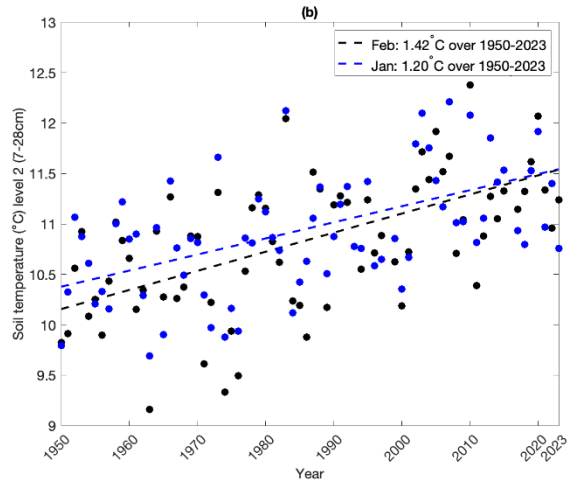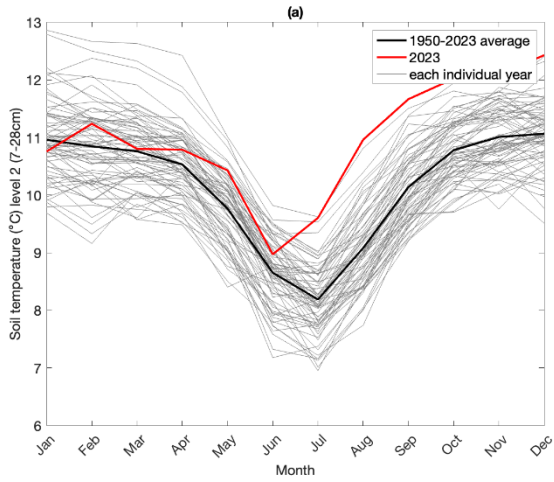
Figure S3. Seasonal cycle of soil temperature (°C) in layer 2 for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b) with both Jan and Feb showing significant warming trend over the period analysed here.

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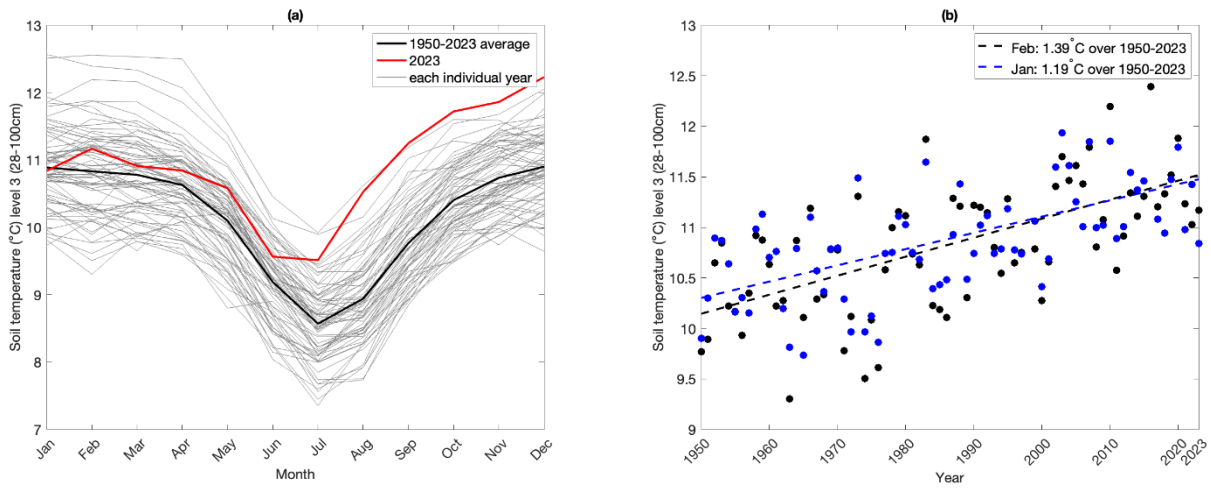
Figure S4. Seasonal cycle of soil temperature (°C) in layer 3 for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant warming trend over the period analysed here.

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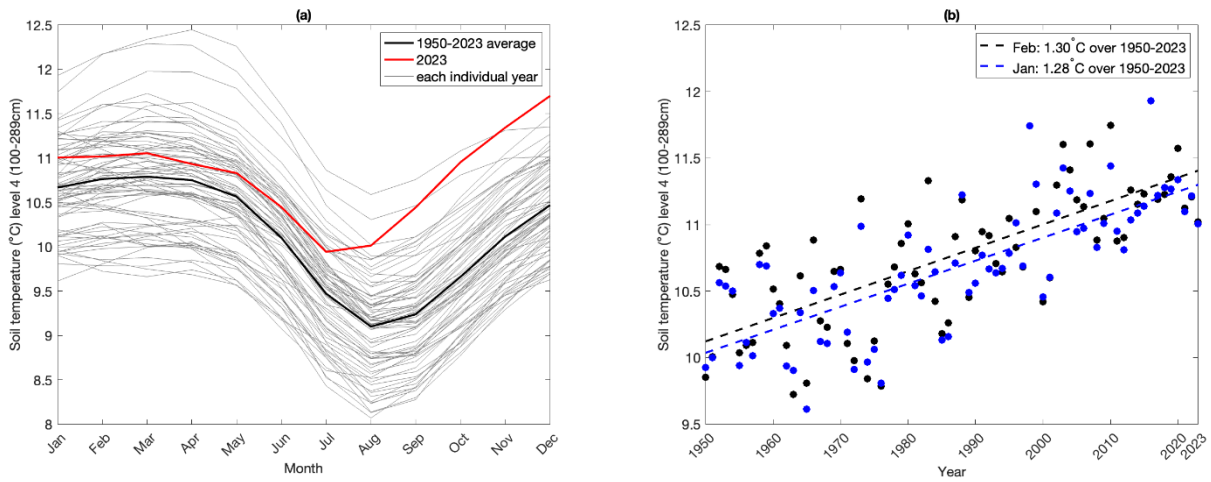
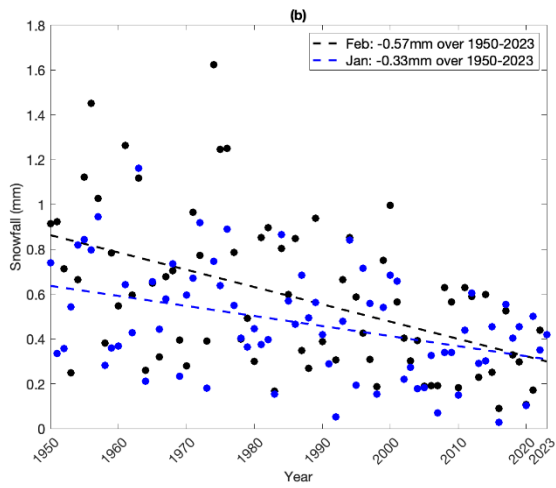
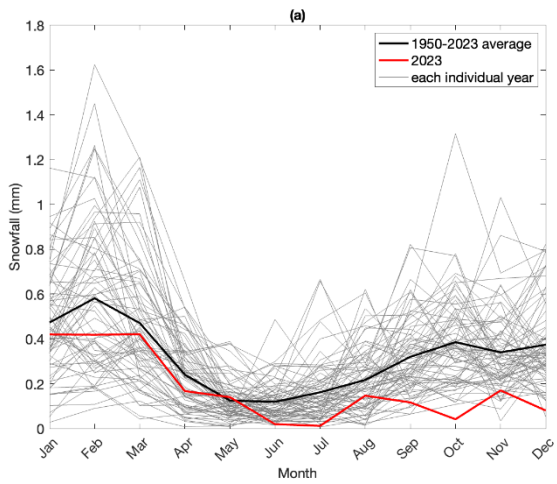
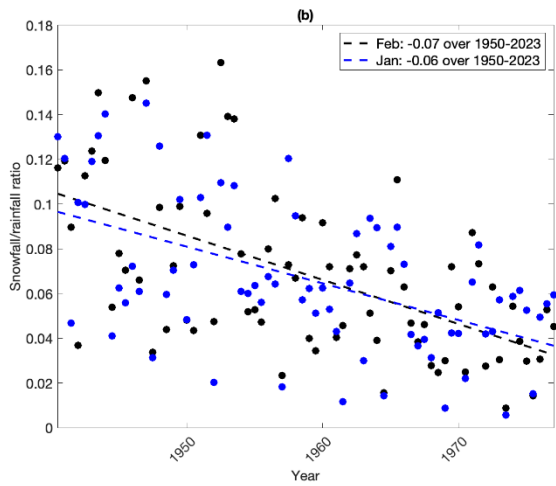
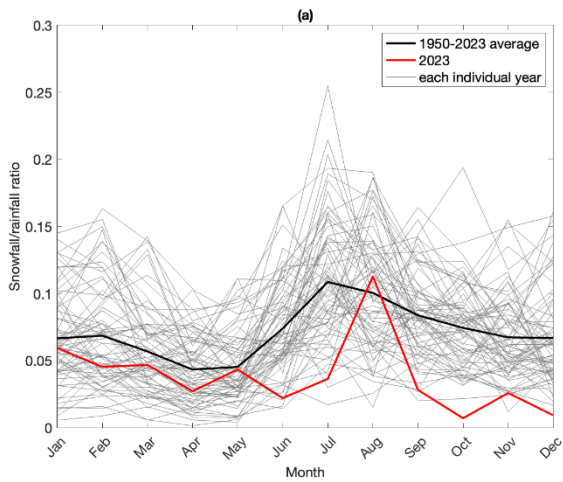


Figure S5. Seasonal cycle of soil temperature (°C) in layer 4 for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant warming trend over the period analysed here.

40 **Figure S6. Seasonal cycle of snowfall (rainfall plus snowfall in mm/day) for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant decreasing trend over the period analysed here.**

45 **Figure S7. Seasonal cycle of snowfall to total rainfall ratio (unitless) for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant decreasing trend over the period analysed here.**

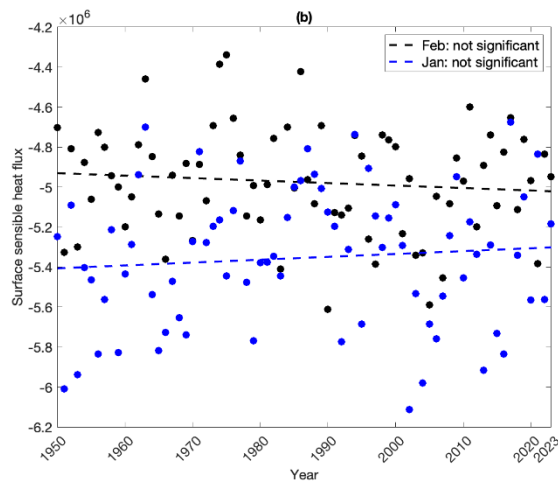
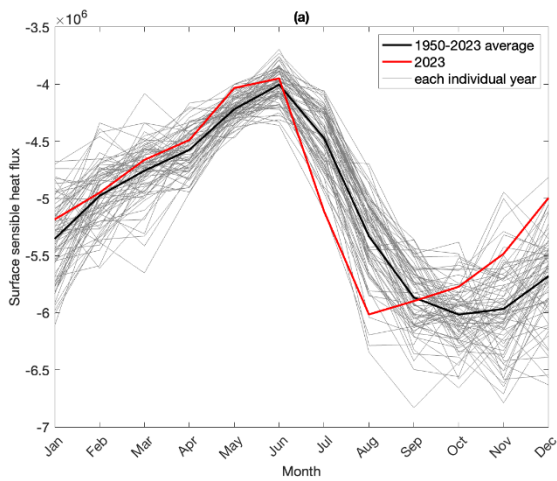



Figure S8. Seasonal cycle of surface sensible heat flux (J m-2, positive values are downwards) for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with no significant trend for neither Jan nor Feb.

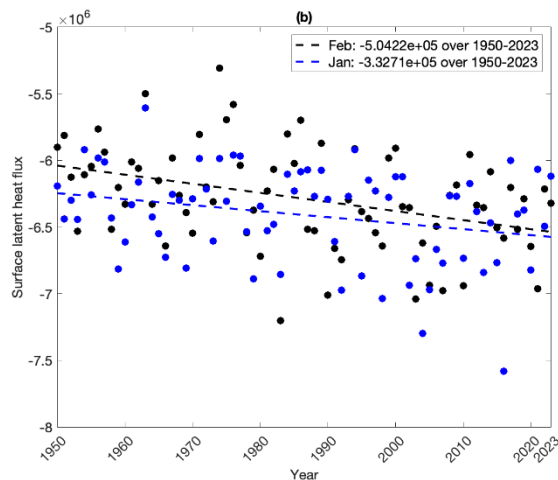
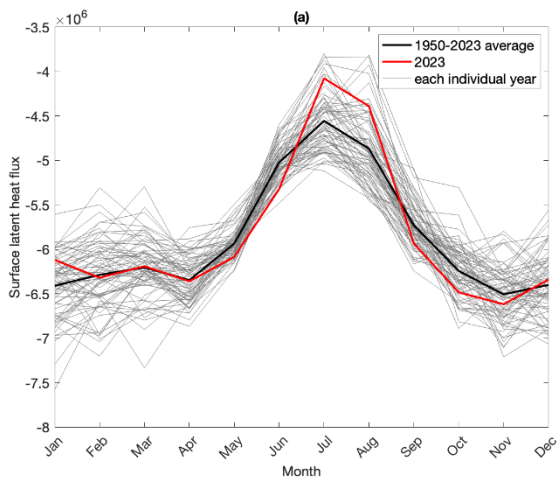



Figure S9. Seasonal cycle of surface latent heat flux (J m-2, positive values are downwards) for 1950-2023 shown in panel (a), and the historical trend for Feb and Jan shown in panel (b), with both Jan and Feb showing significant decreasing trend over the period analysed here.