INTEGRATED ANALYSIS OF THE SIERRE LANDSLIDE, RHONE VALLEY

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1. Introduction

Following the retreat of glaciers after the Last Glacial Maximum (LGM), there was an increase in large mass movement activity in the alpine valleys. Today, the danger of such a natural disaster poses a continuous threat to the urban areas in the alpine valleys (e.g., the Brienz Landslide in the Canton of Graubünden). Investigating past mass movements and assessing return periods has the potential to enhance our ability to predict future hazards. The Sierre Landslide in the Rhone Valley (Canton of Valais) is one of the unexplored large alpine landslides (Fig. 1).

The goal of this study is to use detailed Quaternary geomorphological mapping, surface exposure dating, and modeling to constrain when, how, and why this landslide occurred.

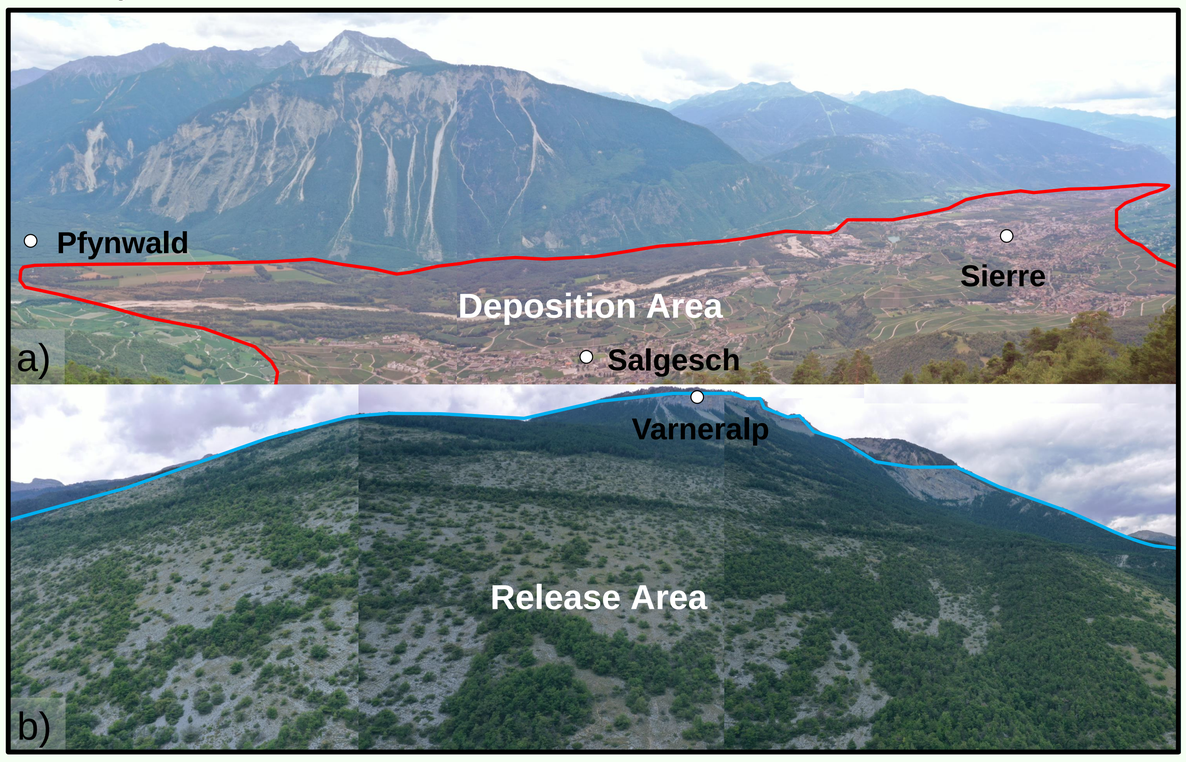

Fig. 1: a) UAV picture of the deposition area, view towards southwest. b) Picture of the release area, view towards north.

2. Study Site

The Sierre landslide, found within the Canton of Valais, has left a discernible scar on the landscape along the border of Salgesch and Varen villages, on the northern slope above the town of Sierre (Fig. 2). The deposits of this significant collapse stretches for 12 kilometers down the valley and encompasses a volume of 1.9 km^3 [1].

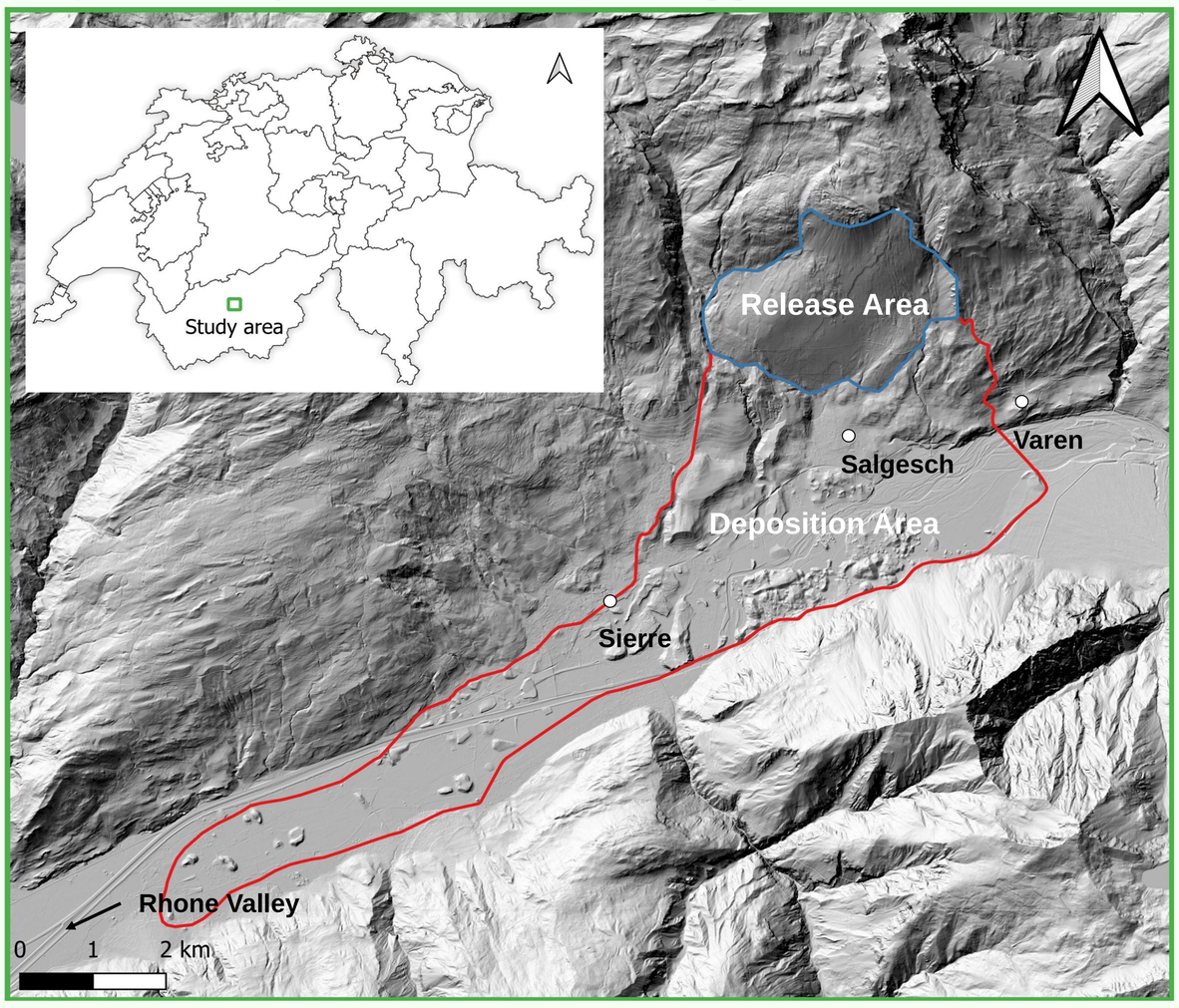

Fig. 2: Hillshade of the Rhone Valley showing the release and deposition areas of the Sierre rock avalanche. © swisstopo.ch

3. Methodology

Quaternary Geomorphological Mapping

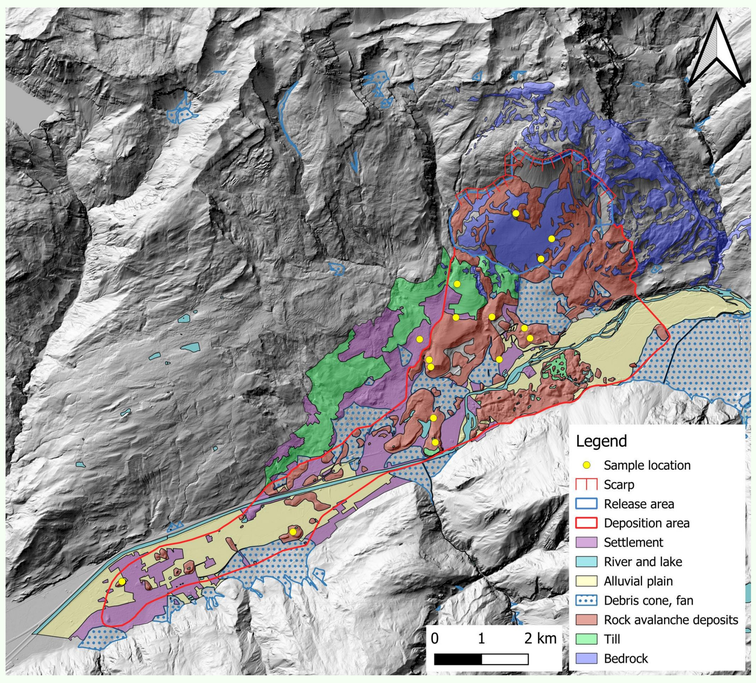

Fig. 3: Quaternary geomorphological map of the study area. © swisstopo.ch

Surface Exposure Dating with Cosmogenic ^{36}Cl

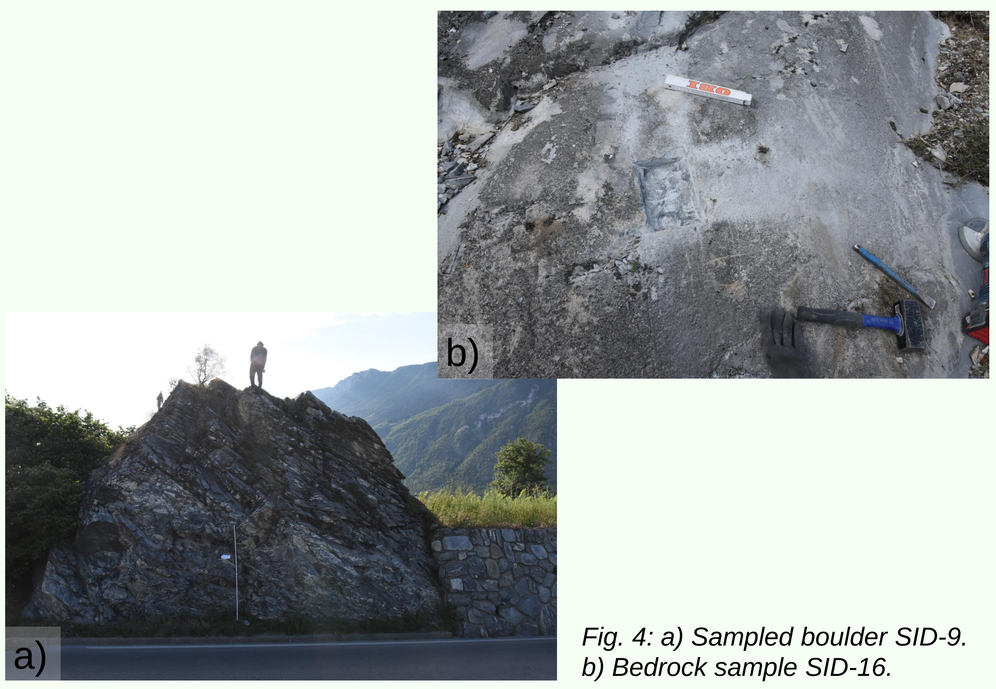

Fig. 4: a) Sampled boulder SID-9. b) Bedrock sample SID-16.

Modelling

Once the landslide timing and volume are constrained, the pre-landslide topography will be reconstructed and the runout will be modeled with DAN3D®.

4. First Results

- The extent of the deposits is revised
- Boulders >1 m are mapped
- 13 surface samples from boulders
- 3 bedrock samples from the release area

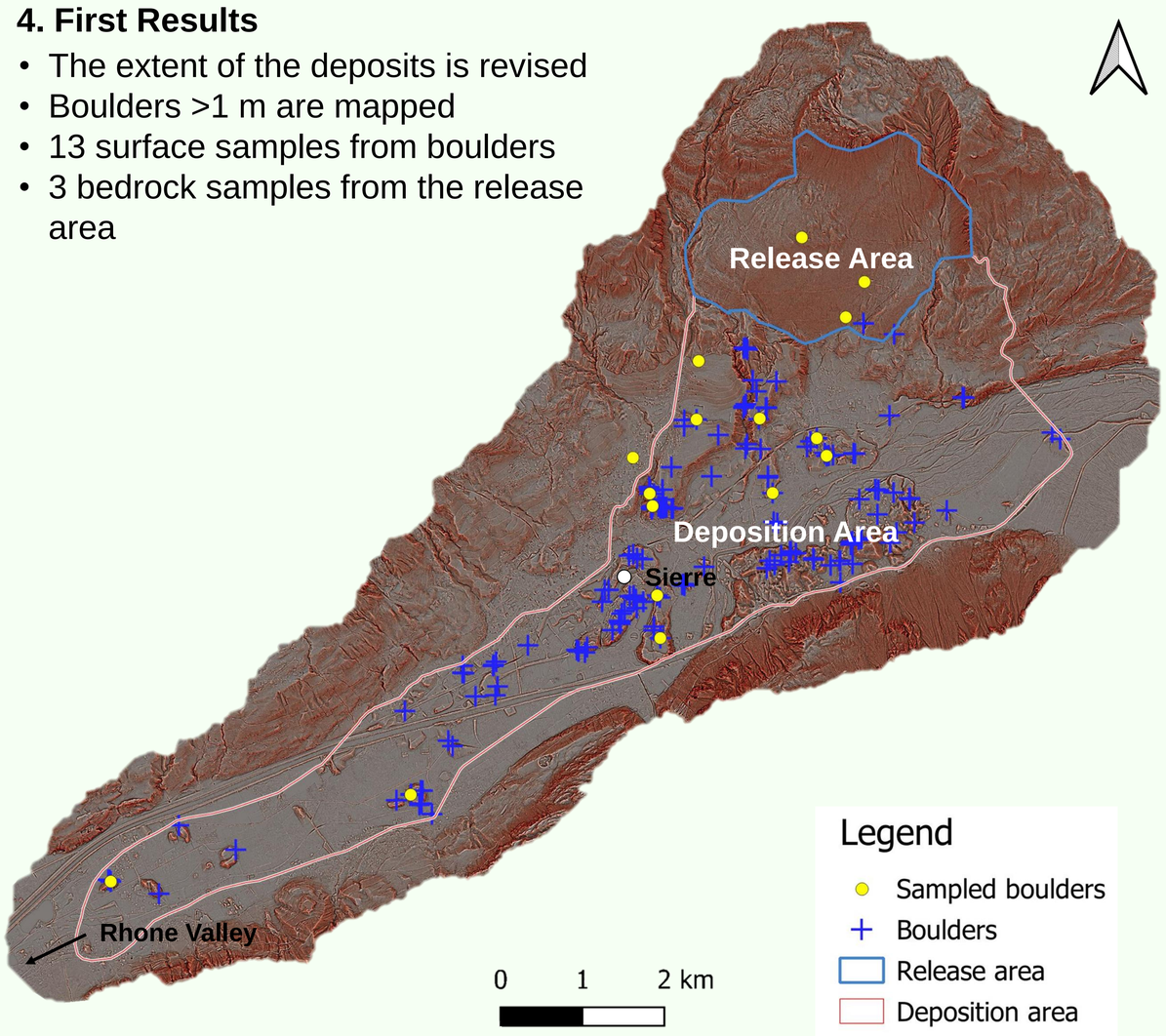

Fig. 5: Red Relief Image map of the Sierre Landslide.

5. Conclusions & Outlook

The timing of the release is not yet known, only a minimum bound is indirectly set to ca. 9 ka based on the ^{14}C ages from two pieces of wood found in channelized debris flows [2]. Further steps of this thesis is to continue the Quaternary geomorphological mapping and the modeling of the Sierre landslide. This study highlights the growing significance of investigating past movements and landscape evolution in the alpine valleys to better assess threats and mitigate future hazards.

Acknowledgements & References

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[2] Schöneich, P., Dorthe-Monachon, C., Jaillet, S., Ballandras, S. 1998: Le retrait glaciaire dans les Préalpes et les Alpes au Tardiglaciaire. Bull. d'Ét. Préhist. et alpines de la vallée d'Aoste, IX, pp. 23-37.