



Excursion of the Swiss Young Geomorphologists (SGmS)

Periglacial and glacial research in alpine environments: history and current evolution

21-22 October 2022

The young geomorphologists' 2022 summer excursion took place in the Saas Valley over two days and was attended by 14 participants from the universities of Fribourg, Basel, Lausanne and Bern. The aim of the excursion was to give an overview of the periglacial and glacial geomorphology, to discuss the impacts of the tremendously dry and warm summer 2022 on the landscape and to go back in time and trace the research done on the historical site of Gruben.

On Friday 21st, the idea was to see the glacierized northwest face of Weissmies (4017 m a.s.l.), which has recently become unstable due to climate-induced glacier thinning of the supporting Triftgletscher below. Unfortunately, bad weather conditions kept the whole landscape invisible (Fig. 1). Therefore, the explanations and discussions were based on the abundantly illustrated booklet that was distributed to the participants.

The second stop was near the front of the 720 m long and 100-150 m wide Jegi rock glacier (Fig. 2). In 2008, the Jegi rock glacier was detected with satellite-borne DInSAR as presenting morphological and kinematic evidences of an ongoing destabilization phase between 1991 and 1999. Since 2009, its surface motion has been under investigation. Since the winter 2013-2014, the entire landform accelerated with seasonal velocities exceeding 10 m/y. The high surface velocity rates ensure a substantial availability of new sediments for further gravitational transfer by debris flows, potentially affecting people and infrastructure at the bottom of the Saas Valley.

On Saturday 22nd, with much better weather conditions, we hiked to the Gruben area (2850 m a.s.l.), a Little Ice Age glacier (LIA) forefield system located within the belt of discontinuous permafrost in which a polythermal glacier and adjacent rock glacier are present (Fig. 3). During the LIA, the Gruben Glacier partly overrode (or superimposed) the upper part of the adjacent rock glacier, affecting its thermal regime and internal structure, inferring that during this interaction phase, glacier ice was embedded within the rock glacier. The analysis of historical aerial images (Kääb et al., 1997; Gärtner-Roer et al., 2022) as well as recent electrical resistivity measurements done by Julie Wee in her PhD thesis (unpublished data) show that ice is still present today almost up to the surface in the upper part of the rock glacier, probably because of the past interaction with glacier ice. The displacement there is mainly vertical, because of ice melt. In the lower part of the rock glacier, the active layer is much more visible.

Since the early 20th century, several periglacial lakes had developed and in cases disappeared again in the Gruben cirque at elevations between 2770 and 2900 m a.s.l.. Glacier lake outbursts and associated floods and debris flows through the Fellbach torrential gully had repeatedly threatened and damaged the village of Saas Balen (1500 m a.s.l.), where the excursion ended after a long descent through the larch forests.

Organisers

Julie Wee and Jonathan Bussard

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Impressions of the excursion



Figure 1: View point from the moraine of the Triftgletscher (Epprecht, 2022).



Figure 2: Explanations on the Jegi rock glacier (Epprecht, 2022).



Figure 3: Gruben LIA glacier forefield (Bussard, 2022).