Landscape evolution north of the Sonnblick (Salzburg) during the Alpine Lateglacial

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The area north of the Hoher Sonnblick, in the Austrian province of Salzburg, offers unique opportunities to study landscape forming events (glacial advances, glacial retreats and mass movements) since the Last Glacial Maximum (LGM). The field work revealed unique relationships of cross-cutting landscape elements.

These include multiple moraines and a till cover of a dominant glacial stadial overlying a giant landslide (0.4 km^3, largest in the province of Salzburg), which is then topped by a younger landslide of smaller dimension. The landslide events (13ka BP and 10ka BP), as well as the glacial advance (12.5ka BP) and retreat (11ka BP) were dated using the 10Be method. To establish an extensive chronology, six 10Be samples from the landslides, twelve 10Be boulder samples and two ^{10}Be polished bedrock samples related to glacier history were processed. Furthermore, ^{14}C samples were taken at suitable sites to augment the ages gained by exposure dating. The combination of the evidence found in the field and a detailed geological map, concentrating on Quaternary features, with ^{14}C dating and ^{10}Be dating made it possible to reconstruct the glacial chronology and the landscape evolution of the study area between 21ka BP and 1850 AD with special focus on the time between 14ka and 10ka BP.

Based on mapping and dating, we modeled the glacial dynamics of the Younger Dryas (Egesen stadial) glacier system and its relation to the prominent landslides (old: Allerød interstadial; young: Preboreal) from the onset of the ice advance to the retreat phase.
Detailed sedimentary evidence allows us to constrain the starting position of glaciers before the Younger Dryas advance, as well as reconstructing a confluence situation of the two local glaciers (Goldbergkees and Pilatuskees), producing a glacier system with a maximum surface area of 10 km^2. Furthermore, distinctive shaped moraine ridges allow us to shed some light on the glacier conditions during stabilization phases during the retreat phases of the Egesen. In addition, surface models revealed a reconstituted glacier geometry for the Egesen-age Goldbergkees.

We employed various methods for calculating Equilibrium-Line-Altitudes (Maximum Elevation of Lateral Moraines, Toe-to-Headwall-Altitude Ratio, Area x Altitude, Area x Altitude Balance Ratio, and Accumulation Area Ratio) and compared them to already available data from western Austria and Switzerland. With this data, we are able to reconstruct temperature and precipitation change of the local climate and glacier dynamics during the maximum of the Younger Dryas in the central part of the European Eastern Alps.

With our multiple-dated Egesen (Younger Dryas) glacier system as a solid basis, we critically discuss the correlation of Lateglacial to Holocene stratigraphy with our study area and other inner-alpine areas, based on high resolution climate archives in the North Atlantic region, which have been targets of palaeoclimate research.

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