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Landscape evolution in the Albula region (Grisons, eastern Switzerland) during the Lateglacial and early Holocene

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The Alpine Lateglacial (appr. 20'000 – 11'500 cal yBP) was characterised by a prominent increase of air temperature and resulted in the disintegration of the foreland piedmont lobes of the LGM glaciation. During this time span, repeated glacier readvances („stadials") occurred and formed distinct morainic systems in mountain valleys as well as other easily recognizable glacial and periglacial landforms that can be interpreted as archives of landscape history. The decipherment of these archives provides insight into process rates and thus gives and idea about the sensitivity and dynamics of Alpine environments to fast and repeatedly changing climatic conditions.

The main goal of this study is to analyse the change of glacier geometries from moraines and transfluence situations through time and the spatial distribution of permafrost (rockglaciers) during the Alpine Lateglacial and the early Holocene by applying a broad spectrum of numerical and relative dating methods. An important element is to improve the absolute chronology which is still based on a very limited number of sites. Both numerical (^{14}C and ^{10}Be) and relative dating methods for the same landforms were used, wherever possible. Cross-checking the different methods provides a better control of the uncertainties and opens the possibility to calibrate the relative methods. Together and combined with the existing datasets, the expected new insights will lead to a better understanding of the history and the processes of high mountain

landscape evolution and are a further step towards improving climate-related modelling of fast warming scenarios and increasing system disequilibria.

Numerous rock and soil samples were collected in the Albulapass- and Val Mulix-area near Preda, Grisons, Switzerland (dating with cosmogenic nuclides; chemical and mineralogical analysis of weathering processes). Field measurements were performed as well (Schmidt-Hammer, weathering rinds). First results show that Schmidt-Hammer rebound-values obtained from lateglacial moraines and roche moutonnées even at different altitudes vary in a similar range. Consequently, no significant age difference could be determined. This supports earlier findings from other authors that the Schmidt-Hammer technique is better applicable on historical and early Holocene than on Lateglacial surfaces. A good distinction of main morphological phases in Val Mulix was obtained, however, using weathering rind thickness measurements. Additionally, soil chemical and mineralogical investigations confirmed the relative time frame of the geomorphological settings. Moreover, clear differences regarding the weathering stage of two moraines could be determined. This seems to prove that one of these moraines could be of Daun-age, as expected based on ELA-depression calculations. First results from numerical techniques such as surface exposure and ^{14}C-dating from upper soil horizons that are expected to support the above-mentioned findings will be presented as well.