



## **Dating of mass movements by rock glaciers: Examples from the Eastern Alps**

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The dating of mass movements still remains a problem, despite great progress in geochronological techniques (e.g. surface exposure dating; SED) as appropriate material or the pre-requisite for dating (e.g. stabilised surface) is missing in many cases. Thus, we still have to rely on relative dating by comparing geomorphological features (e.g. weathering of scarps). However, uncertainties in interpretations of such geological phenomena may lead to ambiguous stratigraphic results.

High mountainous areas do not only resemble features of mass movements but also those of permafrost, especially rock glaciers. At least since the 1980s attempts to correlate relict rock glaciers with glacial stadials of Lateglacial age have been successful in the Eastern Alps. Thus, the lower boundaries of discontinuous permafrost during various Lateglacial stadials younger than  $\sim 16$  ka as well as of Holocene cold phases can be constrained for some regions (e.g. KERSCHNER, 1985, BUCHENAUER, 1990).

We present the results of recent mapping campaigns in Northern and Eastern Tyrol (Tuxer Alpen – GRUBER, 2005, Schober Gruppe – REITNER, 2003) where relict rock glaciers are linked to mass movements in different ways:

1. rock glaciers generated from the disintegrated slope of sagging masses.
2. rock glaciers that were formed within ridge top depressions (tension gaps) or beyond scarps
3. rock glaciers that were dissected by mass movements

The altitudes of such rock glaciers in combination with the known chronology of per-

mafrost retreat within the Lateglacial time enable to constrain the minimum (case 1 and 2) or the maximum age (case 3) of mass movements. In addition to this relative dating potential we emphasise the continuous transition from gravitational to periglacial processes in high Alpine areas.

References:

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