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Paraglacial processes and gully formation on the glacier forefield of Vernagtferner, Oetztal Alps, Austria

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Glacier retreat exposes a landscape highly sensitive to geomorphological changes, such as slope modification, rock falls, accumulations of debris, changes in streamflows etc. The loss of the ice as a counterfort leads to accelerated adaptations of the exposed landscape to the processes occurring at the earths' surface. Church and Ryder (1972) defined these adjustments as "paraglacial", meaning "nonglacial processes that are directly conditioned by glaciation". The timescale of these paraglacial modifications varies from the point immediately after the deglaciation to several hundreds and thousands of years depending on the process in focus.
Paraglacial modifications have been part of several observations in the Norwegian mountains (e.g. Curry 1999, 2000, Ballantyne & Benn 1994). However, comparatively little work on very recently deglaciated areas has been done in the European Alps so far.
One aim of this work was to give an overview of the paraglacially reworked forms in the entire foreland, as the Vernagtferner has never been analyzed from a paraglacial point of view. A further objective was to validate (if possible) the established assumptions for the genesis and development of gullies from various studies (e.g. Curry 1999, 2000, Ballantyne & Benn 1994) in an alpine foreland. In order to obtain a high grade of comparability with these former paraglacial-focused studies, the applied methods, e.g. survey of slope angles, gully parameters like density and size, are similar to those used by Curry and others. The specific focus on gullies becomes necessary, as almost none of the conclusions from dry area gully-studies (e.g. Bocco 1991) has shown any relation and comparability to similar objects formed in high mountain areas. For further insights additional methods like erosional measurements, geophysics and differently scaled mappings were applied.
The results with respect to the genesis of the gullies show interaction between several components. While the basic conditions for generating gullies are constituted by external factors, such as the detected impermeable layer of solid rock in the underground or specific climatic conditions, the studies clarify the occurrence of further formation requirements like specific slope angles, a certain amount of drift thickness and possibly a particular distribution of grain sizes. Overall, most of the analyzes showed a coincidence with those made by Curry and others, although the threshold values obtained often differed. Furthermore, a revised sediment yield model was customized to describe the circumstances in the Vernagtferner and other recently deglaciated alpine glacier forelands.

Literature:
- BALLANTYNE, C & D. BENN. (1994): Paraglacial slope adjustment and resedimentation following recent glacier retreat, Fåbergstølsdalen, Norway. In: Artic ans Alpine Research, Vol. 26, Nr. 3, S. 255-269.
- BOCCO, G. (1991): Gully erosion: processes and models. In: Progress in Physical Geography, Vol. 15, Nr. 4, S. 392-406.
- CURRY, A.M. (1999): Paraglacial Modification of slope form. In: Earth surface processe and landforms, Vol. 24, S. 1213-1228.
- CURRY, A.M. (2000): Observations on the distribution of paraglacial reworking of glacigenic drift in western Norway. In: Norsk Geografisk Tidsskrift, 54:4, S. 139-147