



Establishing a numerical chronology for the Middle Pleistocene glaciofluvial sediment record of an eastern alpine valley (Ybbs) using luminescence dating methods

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In the beginning of the 20th century, Albrecht Penck & Eduard Brückner developed the concept of four large scale Quaternary alpine glaciations extending into the alpine foreland. Since then, the Northern Alpine Foreland (NAF) has played a major role in the investigation of glacial and furthermore paleo-climatic events. This study focuses on the penultimate glaciation (attributed to MIS 6 in Austrian geological maps) when vast areas of the inner Alps were glaciated. In the easternmost part of the north draining valleys of the Alps, the glaciers did not reach the foreland, but formed valley glaciers confined by the mountainous terrain. This also applies for the Ybbs valley. Samples for Optically Stimulated Luminescence (OSL) dating were taken from glaciofluvial sediments exposed in three gravel pits situated close to the present day river course.

Short transport distances as well as a highly dynamic depositional environment of a glacier-fed river system enhance the chances of incomplete resetting of the OSL signal prior to deposition. In such cases, quartz usually is the mineral of choice over feldspar, especially if dose rates are low and theoretically allow gaining quartz ages even beyond 150 ka. However, analyses of the quartz OSL signal characteristics by LM-OSL experiments and by CW pulse annealing have revealed the presence of a thermally unstable medium component contributing to the bulk quartz OSL signal, which may result in age underestimation. To obtain reliable age estimates for the samples, three luminescence signals were investigated (blue stimulated quartz OSL, infrared stimulated feldspar luminescence at 50°C (IRSL) and at an elevated temperature of 225°C (pIRIR)).

Based on the results from these different methodological approaches, a luminescence based chronology was established for the deposition of glaciofluvial sediments in the Ybbs valley. This allows the temporal reconstruction of the glacial processes within the Ybbs catchment area during the penultimate glaciation.