



Establishing age constraints for Middle Pleistocene glaciofluvial sediments in the European Alpine foreland - new insights from luminescence dating

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This presentation summarises the outcome of a project funded by the Austrian Science Fund (FWF) which aimed at establishing new age constraints of deposits and landforms (glaciofluvial terraces) of the northern Alpine foreland (NAF) usually assigned to the Middle Pleistocene. The sediments under investigation were mostly deposited when large piedmont glaciers reached far into the Alpine foreland. Based on the concept of four Quaternary glacial advances to the NAF, which was already developed at the beginning of the 20th century by Penck and Brückner, specific morphostratigraphic units which can spatially be connected over the complete NAF area have been assigned to different glacial cycles and were subsequently correlated with the marine isotope record. However, numerical dating of the respective sediments had only been conducted to a limited extent, and previous studies report several methodological issues that limited the outcome with respect to the geochronological and chronostratigraphical value.

In the course of the project, it became clear that the applicability of different optically stimulated luminescence (OSL) dating techniques for the targeted sediments was strongly dependent on the varying luminescence properties for samples from different catchment areas. By conducting a comparative luminescence dating approach, using different luminescence signals (quartz OSL, and feldspar infrared stimulated luminescence at 50°C (IR50) as well as post IR infrared stimulated luminescence at an elevated temperature (225°C, pIRIR225)), as well as using single aliquot and single grain dating techniques, it was i) possible to confirm but also to overcome prior problems of luminescence dating with the respective sediments ii) discern between samples that were well bleached prior to deposition and samples for which the luminescence signals were not properly reset, and iii) possible to establish reliable geochronological age constraints for the deposition of the sediments under investigation.

The determined ages suggest that the deposition of several Middle Pleistocene proglacial outwash deposits in the NAF is time equivalent with marine isotope stage (MIS) 6. Furthermore, comparing the results from the Eastern and Western NAF implies relatively rapid ice decay in late MIS 6 towards termination 2, which is consistent with previous studies dealing with the penultimate glaciation in the circum-alpine region. Although the dating results allow differentiation between glacial and interglacial periods, a finer resolution on a stadial/interstadial level can unfortunately not be obtained for that time scale by the current state-of-the-art methods of luminescence dating.