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The timing of the infilling of glacially overdeepened structures from the northern Alpine foreland in the context of tunnel valleys from the Fennoscandian ice shield.

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Understanding the timing of the sedimentary infill present in glacially overdeepened structures is crucial for reconstructing past glacial dynamics and Pleistocene landscape evolution. Subglacial erosional landforms are known on the southern margin of the Fennoscandian ice shield (tunnel valleys) and in the northern Alpine foreland (overdeepened valleys). The timing of the formation and subsequent infilling of tunnel valleys is attributed to different marine isotope stages (MIS 4-12) largely based on geophysical surveys where cross-cutting tunnel valley generations can be differentiated with absolute minimum and maximum ages provided (Stewart and Lonergan 2011), but a comprehensive numerical chronological framework of the sedimentary infill remains fragmentary. Overdeepened valleys were systematically investigated in the context of the International Continental Scientific Drilling Program – Drilling Overdeepened Alpine Valleys (ICDP-DOVE) project with drill-cores from representative and complementary overdeepened structures (Anselmetti et al. 2022). The investigated overdeepened structures showed a generally similar sedimentary succession. The chronology of the infill is provided by a robust single grain pIRIR SAR protocol luminescence dating approach using potassium rich feldspar as a dosimeter (Buylaert et al. 2009). Using single grains of feldspar from generally poorly bleached sediments, commonly found in glacial environments can circumvent the signal averaging effect of multi grain measurements that would lead to an age overestimation if not addressed (Firla et al. 2024 in press). Results from this and previous investigation concluded that the fine-grained sediments at the base of the analyzed overdeepenings in the northern Alpine foreland were deposited during the penultimate glaciation. The timing of the infill provides a minimum age for the formation of the overdeepened structures but does not provide information about the absolute age of formation. The timing of the infilling of overdeepened Alpine valleys is discussed in the context of the timing of the formation of the Fennoscandian tunnel valleys and potential chronological differences and similarities between overdeepenings and tunnel valleys are highlighted.

References:

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