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Differentiating cryoturbation from tectonic faulting in a deep exposure across the Lassee Flower Structure of the Vienna Basin Transfer Fault

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Paleoseismological trenching typically exposes faulting in the uppermost meters from the ground surface. In areas with slowly moving faults (< 0.1 mm/yr) that have experienced periglacial conditions in the past, differentiation between cryoturbation, gelifluction, and tectonic faulting is often difficult. In such environments, the exposed trench walls may be entirely influenced by cryoturbation. Here, we present preliminary data from a fault branch of the Vienna Basin Transfer Fault (VBTF) that is exposed at a depth of approximately 10 m below the surface within an active gravel pit. In this pit, only the upper few meters of the outcrop are heavily overprinted by cryoturbation. Therefore, this exposure provides a unique opportunity to study the overprinting effects of cryoturbation on active faulting.

The exposed fault is one branch of the negative Lassee Flower Structure that is part of the NNE-SSW striking left-lateral VBTF delimiting the Vienna Basin towards the east. Geological and morphological data suggest long-term horizontal Quaternary slip rates of 1-2 mm/yr for the VBTF. In addition, moderate seismicity (Imax/Mmax of 8-9/5.7.) is heterogeneously distributed along the VBTF, varying from active segments at the tips of the fault to the apparently seismically locked Lassee segment in the central part of the basin.

The tectonically controlled western margin of the Pleistocene Schlosshof Terrace at the Lassee Flower Structure consists of a $\sim$ 25 m high scarp that has been displaced by several closely spaced faults above the recent floodplain sediments. Results of earlier paleoseismological trenching campaigns at one of those faults indicate that slip along the flower structure results in earthquakes with estimated magnitudes of $\sim$7 and return periods of several thousand years. However, trench interpretation has been complicated due to cryoturbated overprint.

The above-mentioned gravel pit walls expose another fault branch of the Lassee Flower Structure. This exposure gives us the opportunity to get more insights to the tectonic constraints of the Lassee Flower Structure. A vertical offset of more than 5 m of Miocene sediments underlying the Quaternary terrace gravels is exposed over a wide area within the gravel pit. Together with the orientation of oblique slickenlines, this offset helps to pinpoint the long-term total displacement rate. At the uppermost part of the section, parallel subfaults form a negative flower structure interfering with cryoturbation.