Sequence of faulting along the southern margin of the Tauern Window along the upper Möll valley (Eastern Alps, Province of Carinthia, Austria)

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The southern margin of the Tauern window represents one of the major plate boundaries in the Eastern Alps showing a complex structural evolution. After the subduction of both oceanic and continental Penninic domains beneath the Austroalpine upper plate major exhumation related displacement was localized along this margin. This resulted in the formation of a shear belt between the southern margin of the Tauern Window and the Periadriatic fault, and the subsequent activity of distinct faults and fault zones. The structural development of these faults in the central southern part of the Tauern Window reflects this evolution during the final stages of exhumation within the Tauern Window, and related northward indentation of Southalpine units along the Periadriatic fault.

The major set of faults is formed by a N- trending fault system, oriented parallel to the upper Möll Valley, the Döllach-Heiligenblu-Lineament (DHL, *nomen novum*). This and related faults show initial reverse displacement and subsequent right-lateral displacement of several meters, with a cumulative displacement of approximately 5 km. These faults were re-activated as high-angle normal faults with E- and W- directed displacement. During this phase of deformation, the minimum net displacement is about 1,5 km. Additionally, W- to WSW- dipping foliation planes were re-activated as coeval low-angle normal faults. The major faults are characterised by the formation of cataclasites and non-cohesive fault gouges with a thickness of up to 10 metres. WSW- trending faults show left-lateral displacement and are partly traced by some minor valleys, e.g., the Gradenbach and Zirknitz Valleys. These are crosscut and offset during normal faulting along N-S trending fault zones. NW- trending minor faults run parallel to the Mölltal Fault in the southestern part of the Tauern Window. These fault sets are cut by ESE- trending fractures showing minor displacement.

The analysis of fault planes and related slickenside striations shows three phases of contrasting paleostress orientations. During a first phase σ_1 is oriented NW-SE, σ_3 subhorizontally NE-SW. The DHL acts as thrust fault, the faults along the Graden and Zirknitz valley show dextral displacement. During dextral movement along the DHL in combination with sinistral movement along Graden and Zirknitz valley, directions of σ_1 and σ_3 have changed. σ_1 indicates a NE-SE orientation, σ_3 a NW-SE orientation. Finally σ_1 is oriented subvertical, the DHL was reactivated as a normal fault, σ_3 indicates a NW-SE orientation.