Kinematics and palaeostress evolution adjacent to the Salzach-Enns strike-slip fault (Eastern Alps, Austria)

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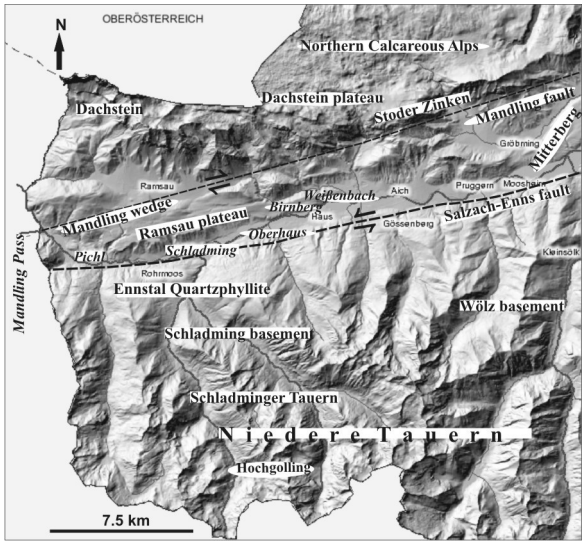
Ductile and brittle structures, geomorphology and neotectonics of the Upper Enns Valley near Schladming in the Eastern Alps have been investigated in order to reveal formation of a fault-controlled orogen-parallel valley. An attempt is made to combine several databases to determine the differences in ductile deformation N and S of the Salzach-Enns fault, and the neotectonic situation and morphological evolution of the area. The Salzach-Enns strike-slip fault trends ENE and follows largely the southern edge of the Enns Valley. Geomorphologically different landscapes are confronted to main tectonic entities (Figure): (1) the Austroalpine crystalline basement (Schladming and Wölz basement complexes) and Ennstal Quartzhyllite exposed in the Niedere Tauern with a young landscape and steep slopes to the south, (2) the Austroalpine Palaeozoic units (Greywacke zone) with lithologies of high erosivity and (3) the Dachstein Plateau dominated by Triassic carbonate successions in the north. Furthermore, the Upper Pleistocene Ramsau Conglomerate overlies the low-grade metamorphic rocks of the Greywacke zone. Provenance analysis of the Ramsau Conclomerate shows the Niedere Tauern as source region and consequently a post-early Late Pleistocene dissection of the landscape by the Enns River. Regularly oriented outcrop-scale faults north and south of the Upper Enns Valley in the study area document Pleistocene to Holocene tectonic deformation, which largely coincides with ongoing seismicity. Palaeostress tensors deduced from slickensides and striae of pre-Cenozoic basement rocks indicate several stages of Late Cretaceous ductile and subsequent brittle Palaeogene deformation independent from the SEMP fault. The further evolution of the valley is dominated by Oligocene–Miocene NW–SE strike-slip compression to Pliocene E–W compression and final Quaternary(?) N–S extension.



- Ductile deformation north and south of the Upper Enns Valley allows classification of three ductile deformation events largely similar N and S of the Salzach-Enns fault. (1) Foliation S_1 formed within greenschist facies metamorphic conditions suggests a Cretaceous age and is sometimes connected with isoclinal b_1 folds. (2) Folding of the foliation S_1 resulted in folds b_2, and crenulation lineation with b_3 folds due to N–S and NNE–SSW shortening, and (3) E–W shortening on N-trending open folds. Fold axes plunge ESE or WNW, remarked CCW rotation likely to Oligocene-Neogene strike-slip motion of the ENE trending Salzach-Enns fault zone.
- We interpret semibrittle ESE and WNW dipping faults with quartz-bearing slickenlines as expression of late Cretaceous extension contemporaneous with subsidence in Gosau basins in the larger area.
- The most interesting result of brittle structural data is that nearly no evidence for sinistral strike-slip and oblique-slip motion along steeply NNW-dipping faults has been found in the working area as it could be expected by the trend of the SEMP fault.