



The Mallnitz synform and its relation to the Mölltal fault (Tauern Window, Eastern Alps, Austria)

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The Tauern Window is the most prominent tectonic window of the Eastern Alps and exposes units derived from both the European continental margin (Subpenninic) and Alpine Tethys Ocean (Penninic) beneath the Austroalpine nappes. Two of the most prominent structures in the eastern part of the Tauern Window are the Mallnitz synform, affecting the Subpenninic and Penninic nappes, and the steeply dipping Mölltal fault which separates these nappes from the Austroalpine nappes. Both structures strike NW-SE and have been interpreted in the past as being cogenetic. Recent mapping and structural and geochronological investigations yield new insight in the structural evolution of the area: Deformation began with nappe stacking in the Penninic (D1) and Subpenninic units (D2), followed by duplex formation (D3), doming and Katschberg shearing (D4), and brittle exhumation including Mölltal faulting (D5).

The D4 Mallnitz synform is bordered to the northeast by two Subpenninic basement and cover nappes (Hochalm-Ankogel and Romate nappes). Near Mallnitz, part of the Romate nappe is folded together with an underlying Penninic nappe (Kolm part of the Glockner nappe). Both are overlain by a Subpenninic cover nappe and on top by a Penninic nappe (Vorderer part of the Glockner Nappe). To the southwest, the Mallnitz synform is bounded by another Subpenninic basement and cover nappe (Sonnblick nappe).

The Mallnitz synform is a D4 structure showing different structural domains along strike. In the northwest it is an open F4 fold dominated by S2 foliation rotated subparallel to the F4 axial plane. Further to the south, S2 dips to the northeast and it is cut by a SW-dipping S4 axial plane foliation. The intensity of S4 increases southeastward along strike of the Mallnitz Synform until it becomes the main foliation. Near Mallnitz in the Kolm and Romate subnappes, SW-NE trending D3 structures are overprinted by D4. From Obervellach to Pucharitz, the D4 synform is rotated such that its southwestern limb dips to the northeast. There, sinistral shear bands are related to the ductile Katschberg Shear Zone (D4).

The brittle Mölltal fault (D5) may have a polyphase history: a precursor of this line offset some Austroalpine units, such that different units and successions are juxtaposed on either side of the fault. The currently exposed fault was partly responsible for the exhumation of the units within the Tauern Window in Miocene time.

Therefore, the Mallnitz synform is not the lateral continuation of the Mölltal fault because their kinematics and conditions of formation are entirely different. The brittle Mölltal fault does not propagate into the Tauern Window and in fact cuts D4 structures of the Mallnitz synform.