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Large-scale fold structures in the Tauern Window involving both Penninic and Austroalpine units?

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The present study emphasises the detailed structure of the northwestern edge of the Tauern Window. For that purpose we focus on the E-W-running boundary zone between Glockner nappe (Penninic, Tauern Window) and Austroalpine Innsbruck Quartzphyllite Complex in the Gerlos area (Tyrol, Austria). Integrating the local geological situation into a crustal-scale transect reveals, that several kilometres of rock thickness are missing, thus indicating that erosion has only left remnants of an original large-scale fold structure formed during Tertiary collision and subduction.

The structural key feature in the Gerlos area, involving the overall mass of the Glockner nappe, is a km-scale synform with a subvertical E-W-striking axial plane ("Gerlostal synform"). Within this synform Triassic clastics and carbonates rest upon the younger Jurassic Bündner schists, thus indicating that the sedimentary succession is overturned and presenting a synformal anticline, respectively. Additionally, indicators of semiductile to brittle E-W-directed sinistal shearing are pervasive throughout the study area. The Austroalpine Innsbruck Quartzphyllite Complex, bordering the units of the Glockner nappe to the north und generally representing the hanging-wall block of the Tauern Window, is partially overlain by the Glockner nappe and hence locally in a footwall-position.

Interpreting both field observations and structural analyses gives rise to the following conclusions:

1. The local foot-wall position of the Innsbruck Quartzphyllite Complex in respect to

the Tauern Window suggests, that the lower members of the Austroalpine nappe stack were involved in the folding going along with nappe stacking in the Sub-Penninic realm during Eocene-Oligocene times. At that time the Tauern Window was probably an active roof duplex, where stacking of crustal scale horses was contemporaneous with thin skinned thrusting in the Helvetic foreland.

2. The Gerlostal synform at the northern edge of the Tauern Window represents the hinge zone of a large-scale downfacing fold-structure. The original core of the fold-structure was likely formed by the previously northwards proceeding slab of the Tux gneiss core. The downfacing geometry may be resulted from coaxial refolding of the isoclinal Tux gneiss during Neogene updoming of the Tauern antiform, thus indicating polyphase folding at crustal scale.

3. The dominant (semiductile to brittle) sinistral shearing along E-W-striking planes indicates that the Glockner nappe in the Gerlos area has accommodated major left-lateral strike-slip in Neogene times. It thus can be inferred, that the offset of the 400 km long left-lateral Salzachtal-Ennstal-Mariazell-Puchberg (SEMP) fault is transferred into a broad shear corridor towards the west, passing over to the N-S-striking Brenner normal fault. The downfacing fold-geometry as proposed in point 2 may be crucial in this concern by providing a host of subvertical E-W-striking planes most convenient for shearing.

With our contribution on the structure of the northwestern Tauern Window - spanning from local to crustal scale - we aim to give insight how nappe stacking coupled with folding can result in extreme crust thickening in the internal zone of a collisional orogen.