

Structure and Kinematics in the Sonnblick Area (Eastern Tauern Window - Austria)

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In the eastern Tauern Window (Sonnblick area, Fig. 1a), the following sequence of nappes is exposed, from top to bottom (Fig. 1b): (1) Austroalpine units (AA); (2) Glockner (GN, derived from the Valais branch of Alpine Tethys); (3) Rote Wand-Seidlwinkl (RS) isoclinal fold nappe with normal and inverted stratigraphic sequences of the most distal European margin (Kurz & Neubauer 1998); (4) GN, refolded around (3); and (5) Sonnblick basement and cover (SO). The SO unit is the highest nappe of the Venediger Duplex (VND) that derives from the European continental margin. The contact of the GN with the RS is a D1 thrust that was subsequently folded into an isoclinal D2 antiform, which we tentatively interpret as a crustal-scale, N-facing sheath fold. We further observe that the GN underlying the RS is in thrust contact with the SO, but that in the Mallnitz area (Fig. 1a and 1c) the RS is missing between the GN and its D2-folded D1 thrust contact with the VND. There, this folded contact is cut by D3 thrusts and further deformed by the D4 Hochalm Dome. We note that this nappe stack differs from that found along the Katschberg normal fault and in the western Tauern Window where there is no RS sheath fold and the RS lies in direct thrust contact on top of the VND.

Based on existing and own maps (1:10000), we discern the following deformation events: (D1) thrusting of the GN onto the RS; (D2) isoclinal folding of the D1-detached RS and overlying GN brings the GN into the inverted limb of an D2 antiform whose core comprises the RS unit; (D3) formation of the crustal-scale Venediger Duplex whereby the previously stacked and folded RS-GN composite unit overlies the roof thrust of this duplex structure; (D4) doming (Sonnblick, Hochalm Domes), tight folding (Mallnitz Synform) and sinistral shearing as part of the Katschberg Shear Zone system (Scharf et al., this vol.); (D5) dextral brittle strike slip faulting along the Mölltal Line overprints D4 structures, but does not extend NW-ward into the central Tauern window.

D1 – D2 are inferred to have occurred during Eocene subduction and exhumation of European margin and adjacent GN, based on a correlation of D1 & D2 schistositities and stretching lineations with late Eocene (~42-32 Ma) HP mineral assemblages in the RS (Ratschbacher et al. 2004; Kurz et al. 2008). D3 is attributed to incipient collision of Adriatic margin (upper plate) and previously accreted RS and GN with the European margin (lower plate). D4 doming and lateral E-W extension accommodated by the Katschberg Shear System is partly a response of the thick orogenic wedge to Neogene indentation of the Adriatic plate. This induced cooling and exhumation between 28-25 and 17 Ma (Inger & Cliff, 2004; Dunkl et al. 2003) and was associated with a significant contribution of erosional unroofing.

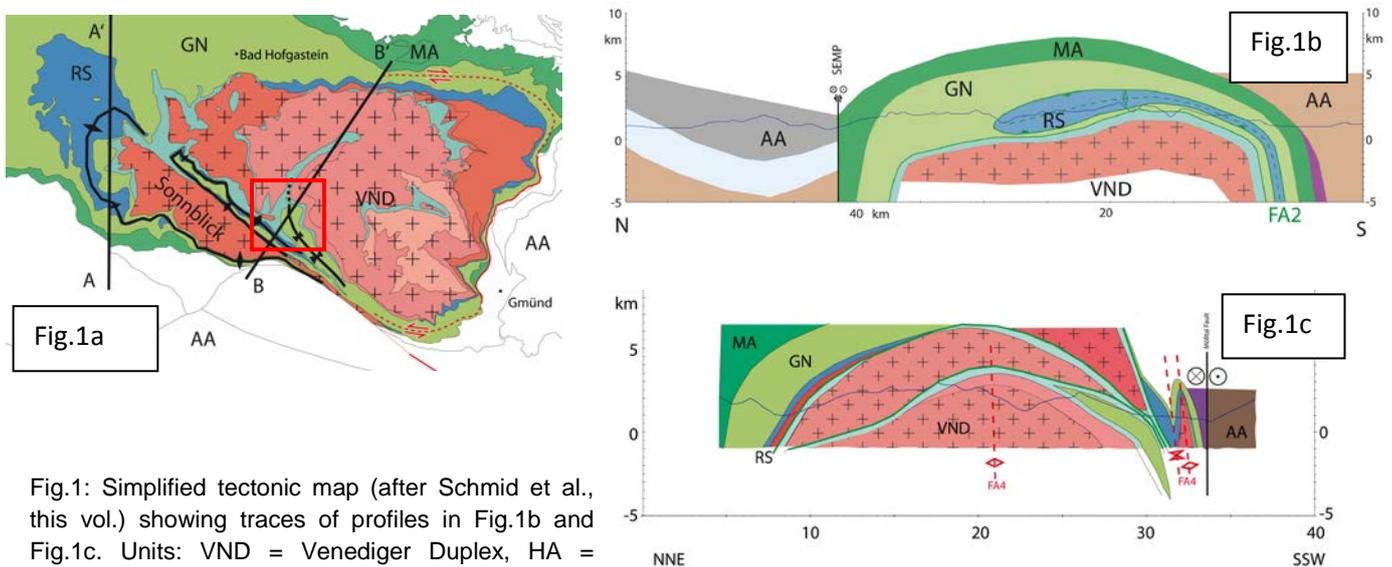


Fig.1: Simplified tectonic map (after Schmid et al., this vol.) showing traces of profiles in Fig.1b and Fig.1c. Units: VND = Venediger Duplex, HA = Hochalm Nappe, RS = Rote Wand-Seidlwinkl Nappe, GN = Glockner Nappe, MA = Matrei Unit, AA = Austroalpine Nappes. In the red square is highlighted the Mallnitz Area.