16th Emile Argand Conference
Alpine Workshop
16-18 September 2024 - Siena, Italy

alpshop2024-62, updated on 20 Aug 2024
16th Emile Argand Conference on Alpine Geological Studies

Strain Partitioning in Front of the Dolomites Indenter: Field Observations in the Austroalpine Nappe Stack

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Shortening in highly oblique convergent settings often causes strain partitioning into components parallel and orthogonal to the block boundary. Field data collected as part of the 'Progetto CARG della Provincia Autonoma di Bolzano - Foglio Vipiteno scala 1:25.000' provide insight into the structural evolution of the area around Sterzing/Vipiteno (Autonomous Province of South Tyrol, Italy), which is located at a key position in front of the Dolomites Indenter. The southeastern margin of the Ötztal Nappe, with its Permomesozoic cover (Brenner Mesozoic), has been overthrust by garnet mica schist of the Schneeberg Complex. Initially, however, the contact between the Ötztal Nappe and the Schneeberg Complex formed as a thrust during the Eoalpine nappe stacking, with the latter unit being in a footwall position. The garnet mica schist of the Schneeberg Complex shows predominantly E-W trending, subhorizontal fold axes with a subvertical axial plane in the western parts of the study area. These folds are correlated with N-S directed shortening that presumably led to the (?Eocene-Oligocene?) emplacement of the Schneeberg Complex on top of the Ötztal Nappe. Progressive counterclockwise rotation of the fold axes towards the east is interpreted as the result of ongoing shortening combined with left lateral displacement. Brittle-ductile, SE-dipping shear zones and NNE-SSW trending strike-slip faults, comparable to the Passeier or Jaufen faults, accommodate sinistral slip in the study area. Interestingly, a thin layer of garnet mica schist (often misinterpreted as schist of the Raibl Group) is wedged into a cataclastically overprinted dolomitic marble of the Brenner Mesozoic below the Monte Velo. The contact shows top-to-the-W kinematics and N-S trending, subhorizontal fold axes with E-dipping axial planes. The geometry of the Dolomites Indenter results in a highly oblique convergent setting in the study area, therefore, this Monte Velo Thrust is interpreted to accommodate shortening orthogonal to the indenter boundary. NW-SE striking normal faults with top-NE-down kinematics dissect the top-W-thrust plane. These normal faults are considered antithetic faults in the hanging wall of the Brenner Normal Fault and represent the final stage of deformation in the study area. Altogether, the observed structures show good agreement with published results from analogue modeling of highly oblique convergent settings and are consistent with the scenario of strain partitioning in a sinistral transpressional regime. Furthermore, the advance of the Dolomites Indenter had a significant impact on the southeasternmost part of the Ötztal Nappe and its contact with the Schneeberg Complex.