The anatomy of the basal shear zone of the High-Pressure Adula nappe and its repercussion on the Alpine regional geology

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Crustal shear zones commonly exhibit constrictional structures at all scales due to intense non-coaxial deformation. Within such deformational regime the lithological units are stretched and elongated along the shear direction, locally loosing their lateral continuity. The missing continuity of marker horizons or diagnostic rocktypes challenges the large-scale geological mapping and sometimes causes misleading regional interpretations.
Here, we present detailed geological maps and profiles (scale 1:10'000) along the shear zone of the lower boundary of Adula unit, the largest High-Pressure nappe of the Central Alps. Overall, the lithological units along this shear zone show a sub-horizontal penetrative foliation (at amphibolite metamorphic facies) parallel to the lithological contacts that dip gently E to the SE. On the foliation plane the mineral and stretching lineation and the fold axis are oriented almost N-S independently on the orientation of the schistosity. However, within this general trend, the lithological boundaries and the foliations may rotate steeply to the E or to the W shaping the gneissic bodies (mostly ortogneisses) as prolate ellipsoids, elongated parallel to the mineral and stretching lineation. Locally, folds with axis parallel to the prolate ellipsoids depict, on the plane orthogonal to the lineation, concentric- or Ω-shapes typical of sheath folds. Large-scale Ω-folds have been mapped in the Pontirone and in the Misox valleys, in the latter case the upright Ω-fold forms the controversial Lostallo tectonic window that exposes the lower unit of the Simano.
We conclude that the most complete explanation for these complex structural patterns is the progressive constrictional shear regime, without invoking polyphase deformation, during the emplacement of the Adula Nappe in the Eocene-Oligocene.