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The nappes of the Lepontine dome: the influence of tectonic inheritance on their deformation style

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The Lepontine dome exposes the tectonostratigraphy of the Central Alps, from bottom-to-top, the subpenninic gneissic nappes of the Leventina, Simano, Adula/Cima-Lunga and Maggia. These units were part of a post-Variscan gneissic crust, which was intensely intruded by several generations of granitoids forming laccoliths and dikes of different shapes and sizes within paragneisses, augengneisses and amphibolites. During the Alpine orogenic cycle this initial and complex geological architecture was reshaped into a fold and thrust belt. We present the effect of these initial rheological anomalies along the Leventina, Simano and Adula/Cima-Lunga units through the geological map of the Osogna sheet (Swiss National Map no. 1293,1:25'000) together with structural and metamorphic data. The geological map shows that the Simano and Adula/Cima-Lunga units have an internal and lateral lithological variation at different scales as illustrated by the geological cross-sections. All lithologies present a penetrative amphibolite-facies foliation, which can vary in intensity among the rock-types. On the foliation plane a mineral and stretching lineation is visible dipping NW or SE, depending on the plane dip direction. The kinematic analysis indicates a top-to-the NW shearing. Despite this consistent structural data showing a regional dominant fabric, the folds (generally with a fold-axis parallel to the lineation) show different styles, depending on the thickness and the rock-type of the folded horizon and matrix, do not form laterally continuous structures and often are not cylindrical. As a consequence, such structures are interpreted as local perturbation rather than structures of regional importance. Furthermore, the Leventina and the Simano boundary is locally incongruent with the tectonic contact of the published maps. The amphibolite and paragneisses, used in the past as nappe divider, result to be deformed magmatic xenoliths. Therefore we present evidence (i) of a bottom-to-top top-to-the-foreland deformation gradient between the Leventina and Adula/Cima-Lunga units, (ii) within this shearing, the inherited rheological heterogeneities in the units lead to non-coaxial ductile deformation complicating the tectonic understanding and (iii) the boundary between the Leventina and the Simano units was a magmatic contact, questioning the allochthonous character of the Simano unit.