Tectonic and microfabric studies along the penninic front and within the dauphinois domain between Pelvoux and Argentera massifs (western Alps, France)


(1) Institute of Geology and Paleontology, Basel University, Switzerland. Ghislain.trullenque@unibas.ch, holger.stuenitz@unibas.ch, renee.heilbronner@unibas.ch, stefan.schmid@unibas.ch; (2) ETH Zentrum, Zürich, Switzerland. karsten.kunze@erdw.ethz.ch

In the arc of the western Alps, the Penninic Basal Contact (PBC) defines the tectonic boundary between the external Dauphinois domain and the internal Penninic units. During Eocene times, the PBC corresponds to a suture zone between Dauphinois and Brianconnais/Subbrianconnais, related to the subduction of the Valaisan ocean (Ceriani et al. 2001). In the Oligo-Miocene, i.e. during a second and post-collisional stage, Eocene structures were passively transported towards the WNW and along a major out-of-sequence thrust: the Roselend Thrust (RT), partially coinciding with the PBC. Recent structural analysis and textural data obtained by X-Ray diffraction goniometry on calcite ultramylonites suggest that the RT finds its southern continuation in a broad shear zone at the rim of the Pelvoux massif and then along the Brianconnais Front at the rear of the Embrunais Ubaye (EU) nappe stack. The RT finally branches into a sinistral strike slip zone behind the Argentera massif. Application of the model of microfabric evolution proposed by Trullenque et al. (subm.) additionally allows for the recognition of strain type variations within this structure. An increasing amount of non-coaxial deformation is for example noted when approaching the Pelvoux massif in the northern part of the investigated area.

On a larger scale, we propose that the Oligo-Miocene change in kinematics of the Adriatic indenter is linked to dextral movements along the Rhone Simplon line to the North and sinistral movements at the rear of the Argentera massif to the South.

The area south of the Pelvoux massif is additionally characterized by SW-directed thrusting, totally absent north of it. Microfabric analysis of calcite ultramylonites found within the Dauphinois para-autochthonous cover from the southeastern rim of the Pelvoux massif confirms the overall top-SW overprinting deformation recorded in this domain. This study documents as well important bulk flow partitioning within the basal decollement level of the Eocene stratigraphic series.

In order to understand these SW directed movements we studied outcrops along strike and in front of the RT, namely the basal decollement of both Dauphinois para-autochthonous cover and Helmenthoïd flysch of the Embrunais-Ubaye nappe stack. In both cases it appears that top-SW thrusting is a late event overprinting earlier features linked to WNW directed displacements.

The youngest deformation event found in the area is consistent with normal faulting along the Durance system. The age of the last two stages (top SW thrusting and normal faulting), although poorly constrained, is probably Late Miocene and Pliocene to recent, respectively.

References