Scanning the Alps in the Pelvoux–Viso geotraverse: a multidisciplinary geological and geophysical approach

S. SCHWARTZ[1], J.M. LARDEAUX[1], A. PAUL[2], N. BETHOUX[3], C. DELACOURT[1] & F. MASSON[4]

[1]*Lab. Dynamique de la lithosphere, Université & ENS Lyon, France*
[2]*LGIT, Observatoire de Grenoble, France*
[3]*Géosciences Azur, Université de Nice-Sophia Antipolis, France*
[4]*Université de Montpellier 2, France*

In the framework of the French GeoFrance 3D rechearch program, a new crustal-scale image of the South Western Alps along the Pelvoux-Viso transect has been performed from a combination of :

1. A new geological map coupled with petrological and thermochronological investigations showing the major crustal discontinuities.
2. Spot satellite image analysis and Digitation Elevation Models in order to obtain the main brittle finite strain pattern.
3. Local earthquake tomography based on the regional seismicity.
4. New gravity data to precise the moho depth.
5. Isostatic modelling using a reference surface at 100 km depth.

We precise the geometry at depth of the Monviso eclogitized ophiolites as well as the position of a deformed rigid mantle indenter of Apulian origin. The location of the earthquake hypocenters with respect to the main velocity contrasts and focal solutions combined with geologic and tectonic constraints allow us to propose a tectonic interpretation at crustal-scale of the recent to present-day tectonics.

The proeminent features are :

- The existence of a slice of cold and rigid mantle of Apulian origin beneath the Dora Maira massif. This rigid mantle body is truncated by a system of deeply-rooted vertical faults related to the Insubric line.
- The Apulian mantle acted as an indenter driving the decoupling of the European crust and at least a part of the exhumation of the high-pressure metamorphic units.
- The deep architecture is characterized by the stacking of crustal slices detached from the European lithosphere. Some of these slices, like the Acceglio unit, represent tectonic extrusion within the overlying Schistes lustrés.
- The Monviso eclogitized ophiolites are plunging up to 20 km depth below the Queyras Schistes lustrés.
- The contrasted tectonic significance of regional seismicity : The Briançonnais seismic arc is related to a network of normal faults and associated strike-slip faults developed during a transtensive regime. The Piemontese seismic arc corresponds to the mantle indenter. The Padane arc is related to inverse fault and associated strike-slip faults which account for the shortening of the Apulian crust.

Finally this new crustal-scale geometry of South Western Alps was used to discuss :

1. The present-day tectonic pattern,
2. The respective roles of tectonic and gravity forces as well as the significance of the present-day topography,
3. The significance of the recent alpine geodynamics with respect to a 3D crustal geometry.

Tectonic features of foredeep basins and foreland plates, and their influence on the geometry of collision mountain belts: the example of the Italian Apennines

V. SCISCIANI[1], F. CALAMITA[1], E. TAVARNELLI[2], G. RUSCIADELLI[1] & W. PALTRINIERI[3]

[1]*Dipartimento di Scienze della Terra, Universita "G. D'Annunzio", Chieti Scalo, Italy*
[2]*Centro di Geodinamica, Universita della Basilicata,Potenza, Italy*
[3]*British Gas - RI.MI., Milano, Italy*

The geometry of collision mountain belts changes through time due to the development of progressively younger tectonic slices that are detached from the foreland, and are piled within the orogenic thrust array. Most detached slices bear the structural signatures of early tectonic events, usually consisting of extensional and contractional deformations; the former are generally