
The crustal-scale shaping of the Western Alpine foreland: lessons from 3D structural modeling

Dorian Bienvegnant^{*1}, Ahmed Nouibat , Christian Sue , Yann Rolland , Stephane Schwartz , Thierry Dumont , Jérôme Nomade , Séverine Caritg-Monnot , and Andrea Walpersdorf

¹ISTerre – Université Grenoble Alpes – France

Résumé

3D modeling enables to bridge the gap between the main tectonic structures observed on the surface and the geometry of the deep interfaces (Moho and basement top) imaged by geophysical data at the scale of the Western Alpine foreland. The final geometry of these tectonic structures is investigated in relation to the geodynamic evolution of the foreland. The main results highlight: (1) a strong contribution of thick-skinned Pyreneo-Provençal and Alpine tectonics, (2) a possible lithospheric rooting of Variscan shear zones/faults, and (3) the large-scale influence of these inherited structures on the post-Paleozoic structuring of the study area. Our 3D model shows that the system of SE Variscan large shear zones/faults initiated at the end of the Paleozoic, impacting the Moho, were reactivated by localized Meso-Cenozoic deformations. This initial Variscan geometry has controlled the geometry of the Vocontian basin, the propagation of different phases of Pyrenean-Provençal deformation, or Alpine deformation at crustal scale. The new data clearly show the transition from a slightly over-thickened crust probably formed during the Pyrenean and Alpine phases (around 40 km thick, below the External Crystalline Massif of Belledonne) to a thinned crust resulting from extensive Meso-Cenozoic phases (around 18 km thick between the Cévennes and the Durance fault system).

Mots-Clés: Western Alpine foreland, Moho, Top of basement, 3D Modeling, Inherited structures

^{*}Intervenant