

3D GEOLOGICAL AND GEOPHYSICAL IMAGING, CASE HISTORIES FROM THE VARISCAN BELT AND THE ALPS

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The national research program GéoFrance 3D is aimed to expand the knowledge of France's subsurface by combining geophysical methods based on geological objects defined by their geometry and physical properties. The Variscan belt developed throughout the European plate at the Devonian-Carboniferous transition. Seismic tomography performed in the Armorican Massif reveals the lithospheric scale of the South Armorican shear zone which represents the main suture of the orogen. Its lateral extension is followed by high resolution aeromagnetic and radiometric surveys. However, in the Massif Central, the collapse of the orogen has overprinted most of the early structures of the collisional stage. Gravimetrical survey and seismic profiles across the Limousin revealed the layered structure of the crust and its decoupling by large transverse extensional faults. An hydrothermal paleofield, active at 315-310 Ma, is responsible of the deposition of epigenetic gold and sulfide. The onset and development of this hydrothermalism are linked to this transition from compression to extension, in connection with an asthenospheric upwelling. The metallogeny of the Variscan belt is revisited in this framework. The present day tectonics of the Alps and its crustal structure remains debated. The combination of neotectonic and sismotectonic studies, new constrains on the age of the high pressure metamorphism and seismic tomography imaging of the crust are indicative of the recent partitioning of the deformation at the scale of the lithosphere. Implications for kinematics of the collision are discussed. From the Variscan belt to the present day tectonics of the Alps, GeoFrance 3D contributes to the definition of a new crustal-scale section through France.