Geophysical Research Abstracts
Vol. 20, EGU2018-17145-1, 2018
EGU General Assembly 2018


# Characterizating a fossilized, contractionally-rejuvenated salt province: A case study in the Chainons Béarnais (North Pyrenean Zone)

Esther Izquierdo-Llavall (1), Armel Menant (2,3), Charles Aubourg (2), Jean-Paul Callot (2), and Guilhem Hoareau (2)

(1) E2S-UPPA, UPPA-CNRS-Total, Laboratoire des fluides complexes et leurs réservoirs, IPRA, Université de Pau et des Pays de l'Adour, France (eizquierdollavall@gmail.com), (2) Laboratoire des fluides complexes et leurs réservoirs, Université de Pau et des Pays de l'Adour, IPRA,France, (3) IPGP - Tectonique et Mécanique de la Lithosphère

The Northern Pyrenees and the Aquitaine Basin are a well-known, ancient salt province where the onset of salt tectonics took place during Late Jurassic-Early Cretaceous times (salt being Late Triassic in age). During the mid-Cretaceous (∼110 Ma), the development of a hyperextended margin associated with mantle exhumation favored salt tectonics. Gravitational gliding of post-salt units over the exhumed mantle played also an important role.

Since the Late Cretaceous (∼83 Ma), the hyperextended and salt-bearing margin was contractionally deformed. Previous salt structures localized shortening and were squeezed and tightened up to define the present-day geometries. From the present structure, distinction of inherited geometries from those due to latter contraction remains a challenging but crucial task in order to carry out a proper reconstruction of the past salt geometries. The ∼100 km long Chainons Béarnais, located in the Northern Pyrenees (SW France), constitute a well-exposed fold-and-thrust belt in which the contribution of pre-collision salt structures and post-collision deformation remains to elucidate.

To face this problematic, we propose to enrich geological cross-sections and analogue database with data from two different and independent techniques: Raman Spectroscopy of Carboniferous Materials (RSCM) geothermometer and paleomagnetism. RSCM yields the maximum peak temperatures undergone by Mesozoic units in the range of ∼200-500°C. Paleomagnetism is here used to define a reference frame to demonstrate late tilt of Mesozoic units.

RSCM former and new results range from ∼230°C to ∼420°C and suggest the presence of straight and slightly northwards tilted isotherms that cut across the present-day tight folds, consistently with early observations by Menant et al. (EGU, 2016). These isotherms, although locally complicated by late folding, would indicate a post-major folding thermal reset. Paleomagnetism evidenced a remagnetization carried by pyrrhotite. Because of the mineral assemblage carrying this magnetization, we argue it was acquired when the sampled units cooled down below 320ºC; i.e. during late extensional to early contractional stages. This magnetization postdated kilometric wavelength folds and it is largely deviated from the Cenozoic reference. We interpret these deviations as tilting toward the North along a horizontal axis, the amount of tilt ranging from few degrees up to 70°. Therefore, this remagnetization can be used to detect late tilting after the cooling of metamorphic units below 320°C.

The overall paleomagnetic and thermal dataset points out that most of the kilometric wavelenght folding in the Chainons Béarnais was inherited from Cretaceous times. The Cenozoic compression produced a local rebuilt of these folds and a regional northwards tilt of the Mesozoic sequence only. A thorough analysis of the data would allow a tentative quantification of inherited versus syn-contractional bedding tilts that is a valuable source of information for the restoration of cross sections to the extensional stage. The combined used of these two techniques is revealed as a useful tool to distinguish the relative contribution of pre-existing from contractionally-rejuvenated diapirs and can be applied to other ancient, hot salt provinces latterly rebuilt under compression.