

## **Structural style of the Languedoc Pyrenean thrust belt in relation with inherited structures and the rifting of the Gulf of Lion margin, SE France.**

Romain Hemelsdaël\*<sup>1</sup>, Michel Séranne<sup>1</sup>, Eglantine Husson<sup>2</sup>, Grégory Ballas<sup>1</sup>

<sup>1</sup> Géosciences Montpellier - France

<sup>2</sup> BRGM Orléans - France

In Languedoc, the Pyrenean thrust belt remains poorly understood, as it is partly buried by the Gulf of Lion. The Pyrenean structures interact with inherited NE-trending faults forming a complex 3D array of basement faults and thin-skinned tectonics. We show evidences of basement high inherited from the Tethysian rifting and differential subsidence of the Jurassic series. The pre-Pyrenean structuration also includes the Early to Mid-Cretaceous extensional faults related to the Durancian uplift event. While the NE-trending Cevennes and Nîmes faults were reactivated as left-lateral ramp during the Pyrenean phase, the NS compression was also accommodated by E-W oriented thrusts. Pyrenean structures were later cut by the NE-trending extensional structures related to the rifting of the Gulf of Lion.

Onshore and offshore domains are correlated based on interpretations of existing and reprocessed 2D reflection seismic lines, and newly acquired onshore reflection seismic lines. The series of balanced regional cross sections provides a reappraisal of the Pyrenean structures in Languedoc, with special focus on the Montpellier-Thau area. We provide new geometrical constraints of the Montpellier Thrust at depth and original description of the thrust belt in the coastal area, including thrusts that are specifically localised above the inherited basement highs. Cross section restorations reveal a total shortening of 22 km across the Languedoc region although this estimate does not take into account the left-lateral motion accommodated by the major strike slip faults.

The Palaeozoic basement highs (Sète-Gardirole) separate different Tethysian blocks, and we propose that they correspond to restraining bends, which accommodated thrusting across the northern Pyrenean chain. During the Pyrenean orogeny, the Languedoc area formed a NE-trending left-lateral shear zone, encased between the Cevennes and Nîmes major faults. Such kinematics transferred NS shortening from the eastern Pyrenees to the Provence chain. Furthermore, distribution of the Mid-Cretaceous bauxites and Lower Cretaceous (Neocomian) series suggest similar kinematics. During the Mid-Cretaceous time, the Languedoc region formed an uplifted NE-trending transfer zone between the N-S extension in the Pyrenean rift and N-S extension in southern Provence.

**Keywords** : Pyrenean compression, Languedoc region, Gulf of Lion, Thau-Sète area, inherited tethysian fault, Durancian uplift phase, inherited basement high, fault reactivation.