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Upper Cretaceous Paleogene evolution of the Pyrenean retroforeland (Aquitain basin). Insights for Iberia Eurasia convergence.

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The southern foreland (proforeland) of the pyrenean orogeny is one of the most well- known foreland in the world, on the opposite its northern retroforeland (i.e the Aquitaine basin) which display a quite different tectonic style is less documented apart from local petroleum studies. Strong efforts have been made in the recent years to improve the knowledge of the Pyrenean orogeny and Aquitaine basin. We present here a synthesis of the Aquitain basin evolution during Upper Cretaceous and Paleogene based on the integration of more than 800 petroleum wells and 5000 km of seismic profiles. An harmonized and detailed litho- and sequence stratigraphy was build up for the entire period allowing to recompose large scale sections, thickness and facies map at the scale of 1 My, and sedimentary response to compressive deformation. The distribution, style and timing of deformation of the retroforeland are precised thanks to refined stratigraphic constraints.

Within Cenozoic, five major tecto- sedimentary cycles are identified:

2 Paleocene cycles :

- A Danian-Selandian cycle (P1), and a Thanetian cycle (P2), both characterized by carbonate platform growth and limited compressive deformations.

3 Eocene cycles:

- An Ypresian- Lower Lutetian cycle (E1) composed of prograding deltas from east to west that redistribute material coming from the emerging mountain belt in eastern Pyrenees. This progradation trend leads to relatively quick infilling of the available space and emersion of a large part of the basin.
- A Lutetian- Bartonian cycle (E2) composed of mixed carbonate siliciclastic deposits.
- A Priabonian cycle (E3) marked by a large scale emersion of the basin and deposition of fined-grained continental sedimentation (Molasses d'Aquitaine).

The timing of deformation is refined and confirms (1) the onset of compressive deformations during upper Cretaceous, (2) the occurrence of a relatively quiet period during Paleocene, and (3) a major period of basin deformation during Eocene. Within the basin, compressive deformations take place at both basin and local scale the latter being mainly recorded as reactivation of inherited extensive faulting dating from Albian and /or late Variscan extension, and salt tectonics reactivation mainly in the western part of the basin.

Within Eocene, two periods of deformation corresponding with the two successive tecto-sedimentary cycles (E1 and E2) are identified. Onset of compressive deformations is diachronous from east to west. Early Eocene deformations mainly take place in the eastern and central part of the basin, with renewed deformations around Paleocene- Eocene boundary, coeval with the onset of terrigenous input from the growing mountain belt, and major pulse by Upper Ypresian. Late Lutetian- Early Bartonian deformations during cycle E2 are recorded throughout the basin and trigger major depocenter shifts.

This refined timing of these deformation correlates with the one of the southern Pyrenean foreland deformations and suggest common control.

These results were acquired during the Gaia project, founded by TIGF, BRGM and Agence de l'Eau Adour/Garonne which aims to constrain the nature and dynamics of deep Upper cretaceous and tertiary aquifers of the Aquitaine basin.