

Tectono-stratigraphic evolution of the northeastern Pyrenean Foreland Basin

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The Aquitaine basin, on the northern flank of the Pyrenees was subject to intense hydrocarbon exploration until the 1990's, generating a huge dataset that has been under-exploited until now. In the framework of the French Pyramid ANR project this dataset was used, together with new field data, to reconstruct the evolution of this retroforeland basin. This study focuses on the eastern retroforeland, from the Corbières to east to the Toulouse Fault to the west.

In terms of age, the main depocentres are however contemporary along the whole eastern basin:

1) From Upper Cretaceous to Paleocene (Campanian to Selandian) the early foreland basin, known as the "Flyscht Trough", was filled by a succession of turbidites passing upward into fluvial sediments that prograded axially from the east.

2) From Thanetian to Oligocene, a second cycle started with a deepening upward trend until the Ypresian (inner carbonate platform to mixed open marine) and changed to a shallowing upward succession, passing from open marine sediments, coastal clastic deposits and then to coarse fluvial deposits from Upper Ypresian to Oligocene. Progradation was again initially axial from the east. However, a new south to north fluvial drainage developed from the emerging relief of the Pyrenees to the south.

In terms of location and structural style of these depocentres, the salt-free eastern basin (from the Corbières in the east to the Toulouse Fault to the west) reveals a distinctive style to the salt-rich western basin. In eastern foreland (Corbières to Aude Valley), syntectonic depocentres migrated north as a series of wedge-top basins between Late Cretaceous and Late Eocene. The thick-skinned syn-sedimentary foreland structures progressively die out westward. In the western part of the study area (Plantaurel to Petites Pyrenees) stacked depocentres of the same age are preserved in the footwall of the North Pyrenean Frontal thrust recording a slower northward migration associated with a northward propagation of onlap onto the "passive" foreland platform.

Subsidence histories, derived from several boreholes along south-north transects, confirm a two stage history for the eastern foreland basin. The variation from south to north in terms of amount and timing of subsidence validate a flexural model for this retroforeland basin.

The differences in the structure and sedimentary history observed in the foreland basin from east to west records 1) the role of the Variscan structural heritage (Mouthoumet Massif, Toulouse fault); 2) the role of the Upper Triassic evaporitic series as a décollement level in the geometry and distribution of structures, their growth history and in the paleogeography of the associated depocentres.