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Petroleum Geology of the Oil and Gas Commercial Discoveries in Spanish Basins: Southern Pyrenees

The exploration activity in the South-Central Pyrenean thrust and fold belt started in 1952. From that date to the first commercial discovery (Serrablo or Jaca gas field, 1978), over 25 exploratory wells were drilled. The Serrablo dry gas field, which has been transformed to gas storage, has an estimated URR of 40 BCF.

A summary of the petroleum geology of this small, isolated gas province comprises the following main concepts: (i) Source rock: a thick section (300 meters) of Ypresian hemipelagic shale, kerogen type III with TOC below 0.6 % and Ro (%) between 1.0 and 1.3 values. This poor source rock quality is compensated by its significant thickness. (ii) Reservoir: two thick carbonate turbidite megabreccias, Lutetian in age, deposited in the South-Central Pyrenean Eocene Foreland Basin and named megabeds of the Aurin and Jaca respectively. Porosity values range from 1.5 to 2.0 %. However, a late extensional, heterogeneous but predictable microfracture system provides high permeabilities and, consequently, high production rates in the original vertical wells. Furthermore, the productivity of the new generation of horizontal wells has increased by 4 to 5 times the performance of the vertical ones and now produce up to 100 MMscf/day. (iii) Trap: fractured zones of the late Eocene-Oligocene anticlinal structures. (iii) Seal: hemipelagic shale within the flysch megasequence. (iv) Migration pathway: vertical by faults and fractures due to different overpressure stress.

The large Jaca basin is a proven gas basin but it is underexplored in terms of effort and quality of seismic data. Improving seismic definition is the key for future exploration activity.