Revitalizing HC Prospectivity in the Bay of Biscay

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ABSTRACT

The Bay of Biscay is a triangular-shaped embayment located between the northern Iberian Peninsula and the western coast of France. Hydrocarbon exploration in the northern Spanish offshore started in the late 60s early 70s with an intensification between the mid-70s and mid-80s. Wells drilled over the Asturian margin, Cantabrian offshore and Gulf of Vizcaya revealed some significant oil and gas discoveries. More than 48 wells have been drilled in the continental shelf and margin but none of these in the abyssal offshore. Most of the seismic was acquired on the continental shelf and only few deep regional profiles extend to the deep water parts of the North Iberian margin. This study results from a full review of the tectono-stratigraphic evolution and exploration potential of the Bay of Biscay in the offshore northern Spain. The analysis is performed by integrating: the interpretation of more than 15000 km of 2D vintage seismic lines, the results of the main exploration wells, a review of onshore and offshore studies, basin modelling of some key wells and a critical evaluation of the stratigraphic and tectonic frameworks. The integration of seismic interpretation with well data allowed the reconstruction of the main structures that along with the detailed stratigraphic review of play elements lead to the definition of the main play types. Different structures and seismostratigraphic units can be identified in relation with the paleogeographic evolution and three main tectonic events can be identified: 1) Late Jurassic-Cretaceous rifting related to the opening of the North Atlantic Ocean with development of symmetric and asymmetric basins filled by rift sequences and bounded by synsedimentary normal faults; 2) stable passive margin from the Aptian to the Paleocene; 3) thrusting, folding and basin inversion with deposition of syn-orogenic sequences associated with the Pyrenean-Cantabrian orogeny since the onset of the compression during Late Cretaceous. The main exploration targets are at Jurassic and Cretaceous levels. Source rocks are represented by Carboniferous and Jurassic shales. Seals are made of clay and marly intervals within the Meso-Cenozoic. Potential traps were formed both during rifting compressional phases. This area still contains many potential undrilled structures both within the shelf and in the deep-water side. These prospective areas may attract interest to boost renewed exploration of the northern Spanish offshore in the next years.