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Geodynamics of the Gulf of Lion: Implications for Hydrocarbon Exploration

The deeper part of the Gulf of Lion (GoL) margin is an under-explored frontier area with interesting petroleum potential. The eleven exploration wells drilled in the proximal part of the GoL did not reach the Oligocene sequence most prospective onshore.

TGS-NOPEC's new regional seismic grid over the area provides detailed information from the pre-salt sequence. Good quality seismic data allows clarification of the architecture, resulting in a new hypothesis on the pre-Oligocene tectonics. The GoL is the result of Oligo-Miocene anti-clockwise rotation of the Corsican-Sardinian Block from the European Craton. This extension rejuvenated a very complex tectonic framework inherited from the Tethyan evolution and the Pyrenean orogeny. The Eocene (Pyrenean) compressive phase appears to have caused thickening of the entire crust. Hence, the GoL cannot be classified as a simple passive margin.

Increased understanding of the basin evolution improves the petroleum potential. 1- The Oligocene sequence is well known in the Southeast French basin (Camargue Trough) and contains very good Type I and Type III source-rocks in a proven petroleum system. Oil or gas generation is predicted by extrapolation of these source-rocks into the deeper part of the GoL margin / Liguro-Provençal Basin. 2- The pre-Oligocene "basement" is complex and heterogeneous. Mesozoic sediments could be preserved, and an older petroleum system (Upper Cretaceous coal / Jurassic shale) may have been active during Tertiary sedimentation.

An interesting shallower petroleum system could be developed in a thick basal Pliocene sequence deposited basinwards from the margin that has been drilled.