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Transfer Faults in the Valencia Trough: Implications for Hydrocarbon Exploration

The Valencia Trough of NE Spain is an extensional basin surrounded by compressional systems, and has produced petroleum since the late 1960's. It is the Neogene reactivation of a back-arc basin through a scissor like opening. Transfer faults trending NW-SE permit different blocks to move with respect to one another at different spreading rates.

Previous work, primarily onshore, indicates that these transfer faults reactivated Late Hercynian planes of weakness during Mesozoic rifting event, and acted as paleogeographic limits, controlling facies distribution from Cretaceous times onward, and deforming sediments until Late Serravallian. Speculation, based on paleogeographic and gravimetric studies, was that these features extend offshore into the Valencia Trough (e.g. the Menorca Transfer fault). However, confirmation was missing, due to the lack of conclusive seismic data.

This study, which integrates regional mapping with modern 3D seismic and recent exploratory well data, not only confirms that the transfers were active offshore, but presents direct evidence that they represent a transpressive and transtensive regime which provoked enhanced permeability within the basin's main productive interval, which is a normally tight carbonate unit. Palm-tree fault geometries, a classic characteristic of transpression, provide anticlinal and fault-related traps that are proven targets for exploration, which up until now has been focused on the NE-SW normal fault trend. On the other hand, transtensive or tulip features provide low areas for Early Burdigalian? to Langhian source rock accumulation. These results indicate that transfer faults are a critical element in defining the hydrocarbon prospectivity in the Valencia trough, and their identification can be employed in the prediction of source rock and reservoir distribution.