

## **The Petroleum Potential of the Offshore Sirt Basin, Libya, Defined Using New, Mega-Regional Seismic Data**

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### **ABSTRACT**

Libya has yielded some of the world's largest petroleum discoveries, primarily within the onshore Sirt Basin. The extent of this system into the central offshore, however, remains poorly understood due to a lack of exploration and limited fully integrated studies. Recent successful wells have proven a working petroleum system within the offshore Sirt Embayment. In this study we will demonstrate the likely extent and character of this system across the entire offshore Sirt Embayment, placing the basin in its regional context whilst understanding the relationship with the highly prolific onshore areas. This evaluation will be key to reducing uncertainty in future offshore exploration of this potentially huge under-explored petroleum province. Newly acquired and processed deep, regional seismic data from the Libya SPAN survey and reimaged 2005 2D seismic data is interpreted and integrated with the offshore well data and existing onshore knowledge. These data allow a well constrained crustal-scale structural and tectonic model to be defined and placed within the regional context of the tectonically complicated central Mediterranean. We will demonstrate the extent of the different crustal domains and their structural relationships, including a refined delineation of the Ionian oceanic crust and a constrained structural elements map of the whole Libyan offshore. The new data allows for the recognition of multiple inversion and transpressional events across the Sirt Embayment and the implications of this to the offshore petroleum systems will be discussed. An integrated regional depositional and petroleum systems framework will be presented, constraining the extent, thickness and likely depositional environment of the stratigraphy from the Palaeozoic through to the present day. The results provide an enhanced understanding of the petroleum potential in the region, identifying numerous plays, both as extensions to the known onshore systems and newly identified play types. Basin modeling has been undertaken and clearly demonstrates that Upper Cretaceous source rocks are mature across much of the Sirt Basin extending exploration potential north of the Cyrenaica Ridge.