Using Gravity and Magnetic Data to Delineate Deep Basin Geometry and Faulting: Implications for Paleozoic Sourcing for Permian–Triassic Reservoirs in the Partitioned Zone/Divided Zone of Saudi Arabia and Kuwait

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Within the Partitioned Zone/Divided Zone (PZ/DZ) of the Kingdom of Saudi Arabia and the State of Kuwait, Wafra Joint Operations (WJO) utilizes non-seismic geophysical technologies as a means of complementing and leveraging the value returned by seismic exploration efforts – this in order to optimize development of the PZ/DZ asset. Legacy gravity data available in the area (dating back to 1949) were confirmed and supplemented by a ground gravity program acquired in 2010. Future plans initiated by WJO include the execution of an airborne gravity gradiometry and magnetic survey using latest technologies.

In this presentation we discuss the present and future use of gravity and magnetic data for delineating deep basin geometry and faulting manifested within the pre-Khuff Paleozoic intervals for which seismic imaging is typically problematic and poor. Based on currently available gravity data, the western Partitioned Zone/Divided Zone is high-graded as having a seemingly thick Paleozoic sedimentary section, which may contain Silurian Qusaiba source rock with the potential to charge the Khuff and the Permian–Triassic reservoirs as a whole. In contrast, other areas of the PZ/DZ are downgraded due to the apparent thinness of the Paleozoic section. Building on these positive gravity results, it is expected that the new airborne gravity gradiometry and magnetic survey data will further refine the understanding of deep basin geometry and hydrocarbon sourcing of the Permian–Triassic reservoirs.