Principal Displacement Zone Evaluation over the Jurassic Section of Kra Al-Maru and Riksah Areas, NW Kuwait

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ABSTRACT

It has been thought that Kra Al-Maru Field and Riksah structural settings follow the main N-S, NE-SW and NW-SE regional tectonic framework. This leads to the understanding that these areas have a relatively simple tectonic history.

New structural interpretation revealed various fault patterns in the study area generally following these known regional trends. However, detailed investigation of these faults show difference in timing between the structures and those known tectonic events that were assumed to control the structure, raising the quest to understand the tectonic history of this area.

Through detailed examination of the fault patterns a Principal Displacement Zone (PDZ) has been recognized east of the Kra Al-Maru and intersects Riksah structure. This fault zone possesses varying stress tensors and document events of intermittent compression, extension and strike-slip movement. The complex tectonics and sedimentation overloading has also resulted in reactivation and consequently negative inversion.

The kinematics along the PDZ have been interpreted to be dextral in nature based on the fault pattern and observed displacement from seismic. The zone exhibits a sub-vertical trending NE-SW wrench fault that is segmented and linear to curvilinear on plan view. Segments and are linked by releasing overstep and pull-apart basin towards the SW. This zone has an *en-echelon* nature and the fault system shows coexisting normal and reverse dip-slip over the same fault plane. To the NE the PDZ is characterized by a horsetail splay structure and a less pronounced structural uplift compared to the restraining bend observed along the central part of the PDZ. Riksah structure falls on the horsetail splay zone.
This system has a measured lateral displacement of approximately 1.5 km. The vertical displacement varies along the normal and reverse slip sections, where the normal (shallower intervals) exhibits more dip-slip. This variation in throw is attributed to reactivation and inversion as a result of tectonic activity and salt movement over this Jurassic section.

This paper will explain the various steps that lead to these findings and highlight major application that can be utilized in fracture network predictions.