

## **Tectonic Evolution of Northern Saudi Arabia Basins as Revealed by Six New Regional Structural Cross- sections**

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### **ABSTRACT**

Recently six new regional structural cross-sections were constructed in Northern Saudi Arabia to understand its tectonic evolution. These sections, two oriented at NW-SE direction and four at SW-NE direction, incorporate all new data (wells and seismic) that have been acquired by Saudi Aramco. The new sections consist of different vintages of 2D/3D seismic lines, which were spliced and processed for consistency. Seismic Interpretation of 14 horizons (from base Tertiary Unconformity to top Basement) was carefully performed to tie with all well picks on the cross-sections. They are depth-converted using all well-derived velocity information.

The new sections were then constructed in 2D structural software, where the sequential restoration reveals the following tectonic events: The NW-trending Al Jawf Graben was active during Infra-Cambrian time, as evidenced by growth strata in the Robutain Formation. It reactivated to extend slightly in Silurian time, which may have affected deposition of the Qusaiba Formation. Up to 3000 meters of Paleozoic sediments have been eroded during the Late Carboniferous Hercynian Orogeny, with the Hercynian Unconformity eroding progressively deeper strata toward the northwest. Reversal occurred during Triassic when the NW part of the graben subsided faster than the SE part and received some Triassic sediment. The Late Cretaceous extension produced Al Jawf Graben, with some bordering normal faults having a huge throw of more than 3000 meters.