

## **A Sequence Stratigraphic Comparison of the Paleozoic of the Middle East: Recognizing Plate-Scale Heterogeneity**

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### **ABSTRACT**

The clastic Paleozoic petroleum systems of North Africa are considered to provide robust analogues for those in the Middle East because in both regions Early Paleozoic rocks are modelled to represent deposition on a poorly differentiated, quartz-rich clastic shelf. Through the application of a calibrated 3<sup>rd</sup>-order sequence model, this simple concept is tested.

In the Paleozoic, 3<sup>rd</sup>-order transgressions flooded much of the Arabian Plate but during lowstand, deposition only continued unhindered in broad subsiding marine depocentres. In these depocentres, variations in fill can be expressed by depositional end members that include: basinward stacking of lowstand shorefaces or; transitions from deep water turbidites and muddy slopes to shallow water delta tops. The occurrence of these depocentres disproves the notion of only limited paleogeographical differentiation.

Through the creation of a globally integrated stratigraphic database, it was also possible to provide regional comparisons of deposition by analyzing systems-tract thickness through time. These plots reveal that the Middle East tends to preserve thicker and more variable sequences, which suggests that it underwent more regional subsidence and/or had a greater supply of clastics than North Africa. In the Early Silurian of the Middle East, these differences may have influenced source rock deposition because the extensive source rocks disappeared at an earlier age due to the depocentres becoming more rapidly infilled.

In conclusion, the application of a 3<sup>rd</sup>-order sequence stratigraphic model identifies: regions of significant paleogeographic differentiation; temporal changes in the nature of depositional systems and; the ability to compare sedimentation within and across plate boundaries.