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North Africa and Arabian Plate First and Second Order Sequence Stratigraphy

Prior to the opening of the Red Sea, North Africa and Arabia were part of the same ancient Gondwanan margin. We present a chronostratigraphic correlation, running from Morocco to Oman, that, for the first time, compares the sequence stratigraphy of these two hydrocarbon provinces. It permits the numerous lithostratigraphic schemes in use across this region to be placed within coeval 2nd order depositional sequences. The stabilisation of the stratigraphy at this scale provides the opportunity to identify, date, correlate and map higher frequency maximum flooding surfaces and sequence boundaries between these plates. This task will address the critical geographic and geometric relationships between source rocks, reservoirs and topseals, critical to the reduction of subsurface risk.

Sharland et al., (2001) identified 11 tectonostratigraphic megasequences across the Arabian Plate. They interpreted these to be separated by platewide unconformities resulting from plate structuration and reorganisation, which approximate to a 1st order cyclicity. Comparison with North Africa indicates that many of these unconformities (e.g. Early Cambrian, Late Ordovician, Late Devonian, Late Carboniferous, Late Permian, Late Jurassic and Late Cretaceous unconformities), can be recognised there and are of a similar age, giving confidence in the definition of a common 1st order structural and stratigraphic ancestry.

Between these TMS, Sharland et al., identified over twenty 2nd order depositional sequences in Arabia. Further comparison with North Africa suggests that several of the bounding sequence boundaries are candidates for upgrading to 1st order TMS boundaries; most notably the Late Silurian 'Pre-Tawil' and late Aptian 'Top Shu'aiba' unconformities.