

Stratigraphic Trapping Opportunities in the Upper Cretaceous of the Eastern Arabian Plate

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ABSTRACT

Tectonic deformation during the Late Cretaceous has provided the major structural hydrocarbon traps on the Eastern Arabian Plate. The tectonic events during this period are still poorly understood though. A review of the tectonostratigraphy of the Upper Cretaceous on the Eastern Arabian Plate has led to a better understanding of the individual tectonic movements and highlights new stratigraphic trapping potential associated with these events. During the Late Cretaceous the Eastern Arabian Plate was affected by two major plate tectonic phases: 1) closure of the Neo-Tethys Ocean with NE to SW obduction of the Semail Ophiolite onto the Arabian continental plate and 2) strike-slip tectonics along the eastern margin, which led to the emplacement of the Batain mélange and Masirah ophiolite obduction from the ESE. In the interior part of the plate, four major regional unconformities, associated with these events, can be recognised: 1) Late-Turonian regional uplift with progressive truncation towards the Tethys Ocean of underlying Mesozoic carbonates. This unconformity is associated with major canyon incisions on the platform interior and with a collapse of the northern platform margin. 2) Early-Campanian tectonic deformation, associated with the development of anticlinal structures over reactivated pre-existing faults and basement lineaments, and a regional conjugate set of fractures and strike slip faults. An extensive erosional surface associated with incisions developed in the foreland, while the foredeep received a major influx of siliciclastic turbidites derived from the uplifted Huqf High. 3) Latest Campanian – Early Maastrichtian renewed reactivation of basement lineaments and faults and in places incisions of several hundred meters deep into flat-lying Campanian marls and shales. 4) Late Maastrichtian – Early Palaeocene subaerial exposure and truncation. Several stratigraphic trapping geometries, such as geomorphic, truncation, lateral pinch-out and onlap traps have been identified as associated with these unconformities. Furthermore, lateral seismic velocity changes due to wedging and pinch-outs will affect the depth conversion of subtle traps in the deeper section. Unravelling the different tectonic phases of the often grouped Upper-Cretaceous deformation must offer quite some scope for new stratigraphic trapping potential.