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Cambro-Ordovician Sequence Stratigraphy of the Saharan Platform, Algeria

Berrached FEKIRINE* and Dokka A. N. MURTY**

*Sonatrach CRD, Ave. 1er novembre boumerdès, Algeria

E-Mail: fekirineberrached@yahoo.fr

**Sonatrach DOP, BP 43 Hassi-Messaoud, Algeria

The Cambro-Ordovician series of the Saharan platform were deposited on the tectonically stable Gondwana super continent during the lower Palaeozoic. Sequence stratigraphic analysis of these rocks allows unravelling the combined effects of tectonics and eustasy in controlling the distribution of sediments and the development of bounding unconformities. The strata, deposited in broad intracratonic basins, are very suited to sequence stratigraphic analysis albeit poor index fossils for a refined biostratigraphy. Using a combination of outcrop, cores and well-log facies analysis, a sequence stratigraphic framework was established for the Saharan craton. This framework indicates that the regional depositional patterns were primarily controlled by major tectonic events and that the effects of eustatic sea level changes were superimposed upon these regional controls to produce the depositional sequences and the distribution of facies. Three, low frequency, second order sequences are recognized and studied in detail to demonstrate their character and composition and the geological factors controlling their development. Subsidence rates, depositional slopes, and water depths collectively interacted to influence sediment accommodation and supply in a manner that produced contrasted facies and patterned sedimentary geometries. Sequence boundaries, which tie to major tectonic events such as the Panafrican and Taconic orogenies, Ordovician glaciation and global scale sea level falls, are enhanced by subaerial erosion-nondeposition and easily identifiable. The sediment packages they bound are deposited in one tectonic period and have significance in the development of the basins both in terms of rock thickness as well as span of geologic time. Significant changes in tectonic regime and climate, and hence source area reactivation and relocation, took place at each of them. All component systems tracts are expressed; typical geometries consist of marginal sandstone amalgamation and basin centre expanded, shale-dominated facies. Lowstand deposits, consisting of nonmarine to shallow marine coarse clastics, are highly developed and completely preserved. Transgressive conditions are recorded by thin and shallow marine, aerially restricted, heterolithic facies. The highstand deposits are fully marine, extensive and shale-dominated, with poorly developed top-progradational sandstone episodes. Overall, the Cambro-Ordovician strata feature a high proportion of coarse clastics, with subtle lateral and vertical facies variations. The most prolific petroleum reservoirs are hosted in the lowstand tracts; the highstand and transgressive deposits contain minor and nearly equal amount of hydrocarbons.