Arabian Plate Sequence Stratigraphy: Potential Consequences for Global Chronostratigraphy

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Sharland et al. (2001; 2004) have described 65 Phanerozoic maximum flooding surfaces (MFS) that can be identified and correlated across the Arabian Plate, providing a framework for understanding the regional lithostratigraphy and placing key petroleum elements into a predictive sequence stratigraphic model. Ongoing work has demonstrated that these MFS, plus many newly identified additional MFS, can be readily identified in the coeval stratigraphy of North Africa, along with intervening sequence boundaries (SB) and their correlative conformities. It can be demonstrated across the region that the majority of these surfaces occur within the same biozone, and are coincident with surfaces independently recognised in other (largely passive margin) sedimentary basins (e.g. NW Europe – Hardenbol et al. (1998); West Siberia (Sahagian et al., 1996); Baltica (Nielsen, 2004). This suggests that there is strong eustatic control on sedimentary sequences and that a global sequence stratigraphic model is a reality.

The chronostratigraphy community is currently in the process of defining GSSPs (Global boundary Stratotype Sections and Points) for each Phanerozoic stage. At the time of writing 46 of the 90+ stages have a ratified GSSP. Of these, a number continue to be the cause of dispute, and many of those yet-to-be-defined appear problematic.

Since the evidence for eustatic control on sedimentation is strong, then sequence stratigraphic concepts can assist the definition of GSSPs. Because MFS and SBs relate to changing sea-level, they have associated changes in fossil assemblages making them readily recognisable and correlatable. Therefore SBs provide “natural” boundaries to stages. Indeed many stage boundaries, as currently perceived from their historical stratotypes, lie close to sequence boundaries dated in their correlative conformity position in a basin. It is now possible to envisage the conjugation of the global sequence stratigraphic model with the chronostratigraphic timescale.