AP05

Mid-Cretaceous Sequences of the Arabian Plate and their Global Expression

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SUMMARY

Six maximum flooding surfaces (K90 - K140) of Albian - Early Turonian age were recognised across the Arabian Plate by Sharland et al. (2001). These MFS together with intervening sequence boundaries/ correlative conformities and maximum regression surfaces can be reasonably well age calibrated by biostratigraphy (especially ammonites, planktonic foraminifera and nannofossils) and isotope data. This allows us to correlate these surfaces outside of the Arabian Plate and to test their eustatic origin by demonstrating their occurrence on a global scale.

We have found evidence for the K90 - K140 sequences in locations ranging from Europe, Arctic North America, through the western interior of the US to offshore Brazil, the west coast of Africa, India and Australia. At all these location the expression of these surfaces is biostratigraphically calibrated and hence we can be confident in a eustatic driver for the K90 - K140 sequences.

It is interesting to speculate on the causes of eustacy in the mid-Cretaceous. It seems likely that a growing body of direct and proxy evidence points to a coincidence of climatic fluctuation and eustacy, suggesting that melting and creation of ephemeral polar ice may be a causal mechanism, even in what is commonly regarded as a "greenhouse" time.

The Albian – early Turonian succession of the Arabian Plate has long been regarded as a second-order sedimentary cycle, containing higher-frequency (third-order) cycles. These third-order cycles are the products of relative sea-level change and, given the general tectonic quiescence of the Arabian Plate during the mid-Cretaceous, are therefore likely to be eustatic in origin.

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It is interesting to speculate on the causes of eustasy in the mid-Cretaceous. Although the mid-Cretaceous is a time of the emplacement of large igneous provinces within the oceans, these are unlikely to have created sea-level change at the required pace and amplitude. Instead it seems more likely that a growing body of direct and proxy evidence points to a coincidence of climatic fluctuation and eustasy, suggesting that melting and creation of ephemeral polar ice may be a causal mechanism, even in what is commonly regarded as a “greenhouse” time.

A robust third-order sequence stratigraphic model for the mid-Cretaceous of the Arabian Plate is a valuable tool for regional correlation and mapping, and the recognition of exploration analogues, as well as placing existing reservoirs and source rocks in regional context.