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Albian to Turonian Chemostratigraphy of the Eastern Arabian Plate

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SUMMARY

A chemostratigraphic curve has been established for the Middle Cretaceous Albian to Turonian argillaceous/carbonate sequences of the eastern Arabian Plate. The curve consists of more than 550 δ13C values from outcrop and subsurface data. It is anchored by biostratigraphy and compares favorable with the character of well dated and published curves from the northern tethys realm. Major trends in the isotope profile can be correlated with major oceanic anoxic events (OAE1b, OAE2) as well as some minor events (e.g. Albian/Cenomanian boundary, Mid-Cenomanian event). The correlation suggests an Albian age for the base Natih Fm. with the Albian/Cenomanian boundary coinciding with the top Natit F unit. The Natih C/D sequence is associated with the Mid-Cenomanian carbon isotope event. While the Natih Fm in the Oman Mountains reaches into the Turonian based on biostratigraphy this level is not reached in the subsurface. This is due most likely to erosion on a fore deep bulge prior to deposition of the overlying Fiqa shales. The stratigraphic tie-points provide an excellent insight into rate of deposition and pace of platform development.

A chemostratigraphic curve has been established for the middle Cretaceous Albian to Turonian argillaceous/carbonate sequences of the eastern Arabian Plate. The curve consists of more than 550 d13C values collated from outcrop and subsurface core data. It is anchored by biostratigraphic control points and compares favorably with the character of well dated and published curves from the northern Neo-Tethys realm. Data range between 0‰ and 6‰, tracking the evolution over time of d13C in seawater established elsewhere in pelagic carbonate sequences. Major trends in the isotope profile can readily be correlated with major oceanic anoxic events (OAE1b, OAE2) as well as some minor events (e.g. Albian – Cenomanian boundary and mid-Cenomanian event). The correlation suggests an Albian age for the base Natih Formation. with the Albian – Cenomanian boundary coinciding with the top Natih F unit. The Natih C/D sequence is associated with the mid-Cenomanian carbon-isotope event. While the Natih Formation in the Oman Mountains reaches into the Turonian based on biostratigraphy this level is not reached in the subsurface. In a major oil field in Oman the top Natih carbon isotope signature clearly approaches but does not reach the Cenomanian – Turonian boundary event. This is due most likely to erosion on a fore deep bulge prior to deposition of the overlying Fiqa shales. The stratigraphic tie-points provide an excellent insight into rate of deposition and pace of platform development.

A major source rock interval (the Natih B sequence of Central Oman) which is associated with the infill of an intra-shelf basin has introduced a significant departure of the carbon isotope curve from the global marine trend. This carbon isotope fluctuation may have been caused by a diagenetic overprint or more likely during deposition as a consequence of significant isolation of the intra-shelf basin from normal marine seawater circulation.