Paleogeographic Reconstructions and Tectonic Evolution of Middle East Sedimentary Basin

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The Middle East has an area of around 3,000,000 km^2. Its boundaries to the west, southwest and south are formed by tensional structures, shear faults and grabens of the Gulf of Aden, the Red Sea and the Gulf of Aqaba – Dead Sea rifts. The boundaries to the north, northeast and east are defined by the compressional features associated with the Alpine Taurus, Zagros and Oman Mountains. The first sediments to onlap the metamorphosed Precambrian Arabian shield were Infracambrian to Middle Cambrian carbonates, clastics, and evaporites. This was followed by Late Cambrian through Early Permian marine sandstones and continental to littoral siltstones and variegated shales. The Late Permian to Triassic deposits are mainly widespread carbonates and evaporites and marine and continental beds that were deposited during a period of relative tectonic stability. Their deposition on an epeiric shelf was punctuated by a series of transgressions and regressions.

The pattern of sedimentation from the Permian to the mid-Cretaceous was probably controlled in part by the relatively gentle extensional subsidence interrupted by the eustatic sea-level changes. These eustatic excursions punctuated the facies variations seen in the geologic section bounding them and facilitating their subdivision into formations. Diversions from the Mesozoic eustatic chart are caused by local tectonic events that mask some of the large cycle breaks. This is particularly true of the Upper Cretaceous and Tertiary sections, which were subject to compressional tectonism. However the tectonism of the earlier extensional phase may also have locally masked the effects of eustasy. Most of the carbonates are sheets formed in response to deposition during sea-level highstands while some of the Cretaceous carbonates in the Middle East contain build-ups that caught up with the sea-level highstands following rapid marine transgressions that initially stressed deposition. Shale-rich units deposited during sea-level lowstands and transgressive phases are common in the sequences. During the Tertiary there is a more balanced clastic-carbonate sequence. This very broad generalized stratigraphic history however is a reflection of major structural and tectonic changes that affected the Middle East.