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Middle and Upper Cretaceous Sedimentation Patterns in the Dezful Embayment, SW Iran

The middle and upper Cretaceous sediments of the Dezful Embayment form one of the richest petroleum systems in the Middle East, with the presence of the Khazdumi source rock, the Sarvak reservoirs and the sealing Gurpi shales. This paper presents a sequence stratigraphic analysis of these rocks, proposes predictive geological models, with respect to the geometries and heterogeneities of depositional facies, and analyses the geodynamical basin evolution with the help of paleogeographical maps and isopach maps. Based on 10 outcrop sections and more than 50 wireline logs and paleologs, five tectono/sedimentary phases are distinguished, which group together third order depositional sequences that are similar with respect to depositional system, sediment flux and tectonic control. Phase I, of Aptian age (Gadvan, Dariyan and part of the Khazdumi), is characterised by the creation of a large, starved, organic-rich intrashelf basin surrounded by benthic foraminifera dominated ramps; phase II, of Albian age (Khazdumi), is period of infill of the intrashelf basin, again with the concentration of large amounts of organic matter, and surrounded by benthic foraminifera dominated ramps; phase III, of Cenomanian age (Sarvak), is characterised by extensive and very thick rudist platforms, while only a small, starved intrashelf basin remained; phase IV, of Turonian to Coniancian age (top Sarvak, Laffan, Ilam), shows sedimentation in small local basins with large exposed areas, controlled by the tectonic relict topography; in phase V, of Santonian to Maastrichtian age (Gurpi, Tarbur), the sedimentation is entirely controlled by the creation of the foreland basin. Summarising, the sedimentation pattern is first dominantly controlled by eustatically driven sea level fluctuations, which are during the Cenomanian/Turonian gradually overruled by an increasingly important tectonic control.