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The Sedimentology of the Hydrocarbon-Bearing Asmari Formation of the Miocene of the Zagros Mountains, Iran

The Oligo-Miocene Asmari Formation of the Zagros Mountains of southwest Iran is one of the world's most important reservoirs. Despite this, its sedimentology has received relatively little attention, particularly in terms of outcrop studies. This is surprising, as it can be examined in exposures within ravines cutting through the huge and striking whaleback anticlines that make up the Zagros fold belt. Many of these exposures occur close to existing fields, allowing the opportunity to see the reservoir at surface.

Recent fieldwork has been undertaken measuring sections through the Asmari Formation, in the Tang-e Basht and Tang-e Gurguda wadis, which cut through anticlines situated close to the super giant Gachsaran oil field. The Asmari limestone is typically around 500 metres in thickness, and is generally subdivided into three parts. The Lower Asmari is marly in character near the base, overlain by foraminiferal and coralline algal limestones. The Middle Asmari comprises dolomitised, lagoonal limestones, while the Upper Asmari is more evaporitic. The detailed sedimentological data collected during the fieldwork has been used to develop a sequence stratigraphic framework, subdividing the Asmari limestone into four cycles, and then into 33 subordinate cycles.

This framework has then been applied regionally to explain the distribution of lithofacies within the Asmari Formation across the Zagros. The deposition of the contemporaneous Ghar and Ahwaz sandstone members is examined, suggesting that the northeastward progradation of these sandbodies may have been controlled by relative changes in sea level. This may in turn allow the potential stratigraphic position of lowstand wedges to be predicted. The development of the thick Kalhur evaporites to the northwest has also been addressed. The implications of these findings for undiscovered hydrocarbons are explored.