

Architecture and Sedimentology of Paleogene-Early Miocene Submarine Fan Complex in Washuk-Palantak Area, Northern Makran Accretionary Prism, Pakistan: An Outcrop Study

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Abstract

Siahan and Panjgur formations of Paleogene-Early Miocene age were deposited on a wide spread ocean floor of subducting margin of Arabian Plate prior to episode of structural deformation which resulted in the upheaval of Makran Accretionary Prism (MAP). The Geological investigations for current study have been carried out at exposed escarpments of thrust slices and in the cores of folds nearby Washuk-Palantak area, which represents the central part of northern periphery of MAP. The “Architectural or depositional elements” approach is followed during this study, which is equally viable for interpreting the settings of modern as well as ancient deep marine deposits.

The Architectural elements are basic mappable components and fundamental building blocks of submarine fan complex systems, and consist of key geometries like channels, lobes, chaotic contorted bodies and sheets. Their sub-components like turbidity-flow erosional channels, lateral accretionary packages, leveed channels, levee deposits, frontal splays or distributary-channel complexes (lobes) and sheets representing distal parts of lobes have been observed along with background deposits in the study area. Typical sedimentary structures of turbidites system and ichnofacies representing the deep marine environment have also been observed within investigated Paleogene-Early Miocene submarine fan complex. Based on documented architectural elements and sedimentary structures, the gravity flow has been interpreted as major sedimentary process in addition to pelagic background or suspension deposition of fine-grained sediments. Depositional model has revealed very complex internal and external architecture of possible reservoir bodies within Siahan and Panjgur formations. Due to poor to good vertical and lateral connectivity of reservoir facies at places, prediction of reservoir even at prospect level is not straightforward. The results of this study have significant implications for hydrocarbon exploration in turbidite systems of structurally complex and almost unexplored Makran Accretionary Prism.