

Impact of Taconic Unconformity on the Depositional Geometries of the Lower Paleozoic Clastic Successions in Murzuq Basin, a Case from SW Libya

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ABSTRACT

The “taconic unconformity” is a regional polyphase event occurred during Late Ordovician in North Africa. This major unconformity event is coincided with regional glaciation episodes that controlled the current configuration of the Lower Paleozoic clastic successions. A case study has been carried out utilizing subsurface data represented by 3D seismic lines and well log data (i.e. geological imaging, element capture spectroscopy, lithology and facies logs) to understand the impact of the regional unconformity in Murzuq basin, southwest of Libya. The basin is considered as the second largest profitable hydrocarbon potential in Libya and one of the largest in North African; those were developed during Late Precambrian-Early Paleozoic. The main reservoirs in the basin are mainly comprised of clastic sandstones, which deposited during Middle to Late Ordovician. Series of pre-Ordovician basement faults mapped in the area of study trending northwest-southeast have dominantly controlled the trend of the unconformity as well as the post-depositional sedimentation processes. Based on the interpreted data, the unconformity has clearly impacted the geometries of the whole Lower Paleozoic sandstone successions especially the Ordovician deposits (i.e. Hawaz and Mamuniyat Formations). It has been observed that the unconformity surface concurred with a severe erosion which have expurgated the clastic strata from Middle Ordovician deeper into the Cambrian deposits. It is estimated with more than 900 feet (270 meters) have been eroded by the means of glacial incisions along the strike direction of the preexisted basement faults. This mega cycle of erosion has created a large scale of paleo-lows of more than seven kilometers wide in the area of study. These paleo-topographic geometries have controlled the depositional patterns of both Upper Ordovician clastic reservoirs and Silurian source rock in the basin. This study realized that; the overall clastic successions aged in Early Paleozoic have been deposited under multifaceted events of tecto-stratigraphic throughout the tectonic evolution record of the basin. In this poster, an integrated work was accomplished using the subsurface data to illustrate the complexity of reservoir and source rocks geometries of the Lower Paleozoic sandstones.