

Geological History of the Ghedari Fault Zone in Western Sirt Basin, Libya

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The Ghedari Fault Zone (GFZ), which separates the Dahra Platform from the Dor Alabid Trough, is one of the major fault zones in the Western Sirt Basin of Libya. The geological history of the area surrounding the GFZ in the Concession 32 area of the basin has been reconstructed utilizing seismic reflection data, well logs and the surface geology. The Dahra-Joffra and Bahi oil fields with an estimated 2 billion and 2.8 billion barrels of oil originally in-place, respectively are situated adjacent to the GFZ on the Dahra Platform. Comparison of the stratigraphic record on either side of the fault zone suggests that the early Cretaceous was a time of initial rifting and intense differential subsidence in this part of the Sirt Basin. Bahi and Nubian sandstones and conglomerates had developed along an active fault scarp in the early Cretaceous. A dramatic difference in subsidence rate in Cretaceous time is expressed by a sub-Satal erosional unconformity (possible reinvement surface developed on Paleozoic quartzites) on the platform vs the Rachmat and Sirte strata which were laid down in the trough area adjacent to the then active fault zone. Moderate reactivation of faulting is recorded during Paleocene and early Eocene times by differences in thickness of Satal carbonates and Hon evaporities, respectively. The next phase of extensional faulting combined with strike-slip movements along the GFZ is recorded in late Eocene and post-Eocene times. These movements are expressed in the stratigraphic record by (1) a shift from carbonate platform sedimentation to storm-dominated skeletal accumulations of the Qararat al Jifah strata and (2) by an earthquake-induced soft sediment deformation (i.e., seismites) and (3) by the subsequent shift from marine to continental facies during Oligocene and Miocene times.