

Oil and Gas Potential of Extensional Basins in Western Anatolia, Turkey

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Western Anatolia, Turkey experienced a series of continental collisions from the Late Cretaceous to the Eocene as the Neotethys Ocean closed and the Izmir-Ankara-Erzincan suture zone formed. The Cenozoic post-collisional extension was initiated about 30 Ma ago in Oligocene and is responsible for the formation of many extensional basins in different parts of the region with thick accumulations of Early Miocene to recent sedimentary rocks.

The southern part of western Anatolia contains several sedimentary basins formed by normal-oblique slip fault movement along the Southwest Anatolia Shear Zone which was initiated as a primary breakaway fault during the north-directed Late Oligocene extension. The northern part of western Anatolia contains north-south trending basins. These basins started to form in the Early Miocene related to the north directed extension. They were initiated by large antiforms and synforms that provided the earlier depressions in early Miocene for coarse grained sedimentary rock accumulations of the Hacibekir Formation. The north-trending faults that control the eastern and western margins of these basins were developed as accommodation faults due to differential stretching.

The Alasehir and Büyük Menderes Grabens are two main east-west trending basins located in the central part of western Anatolia. The oldest sedimentary unit in these grabens is the Alasehir Formation, which is time-equivalent to the Hacibekir Formation in the north-trending basins. This suggests that these basins were formed simultaneously in the Early Miocene due to the north-directed Cenozoic extension in western Anatolia. To date, the only hydrocarbon discovery and negligible production is from the Miocene sediments of the Alasehir Graben where shale units in the Alasehir Formation serves as the source rock and rollover anticlinal structures in the graben provide structural traps for the sandstone reservoirs of the Alasehir Formation. However, both Alasehir and Buyuk Menderes Basins have potential for major discoveries in Miocene sedimentary units.