

Re-Evaluation of the Petroleum Potential of the Diyarbakir Basin (SE Turkey): A Perspective from the Ordovician Icemarginal Areas of the Northern Arabian Plate

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Abstract

Geologically the oldest Petroleum System (PS) is the Paleozoic Bedinan/Dadas System, which is located mostly in the Diyarbakir Basin (Southeastern Anatolia) and extends into surrounding portions of Iraq, eastern Jordan, and northern Saudi Arabia. This PS's petroleum source rock is a shale facies in the Dadas-1 member of the Dadas Formation which produces light gravity (commonly greater than 400 API), non-sulfur oil in the foreland basin to the southeastern Turkey. The main source rock interval (the so called 'hot shale') is up to 40m thick with average total organic carbon (TOC) of as much as 5%, and a general Tmax value (4350C-4400C) of maturation in the Diyarbakir Basin. Most of the hydrocarbon play elements known from the Arabian Basin are also known to be present in the Diyarbakir Basin; thick, porous Upper Ordovician sandstones are present and provide excellent potential reservoirs, the Silurian shales should act as effective potential seals or source rocks. The individual members of the Early-Late Silurian (Wenlock- Pridoli) to Early Devonian (Lochkovian) age Dadas Formation of the Diyarbakir area in SE Turkey were evaluated with respect to their potential for petroleum formation based on some organic-geochemical, petrographic, and biostratigraphical analyses. Strata of the Ordovician Bedinan Formation represent the oldest reservoir rocks exposed in the Diyarbakir Basin and with Silurian Dadas Formation in the subsurface were recorded from several deep wells G.Sarik-1 to Silvan-1 in southeastern Anatolia. Arpatepe-1, Bahar-1, B.çaliktepe-1 wells are some of the new discoveries in this region. Mineralogical composition of the Dadas Formation is very important for the hydraulic fracturing operation should be investigated in detail. During the Upper Ordovician time frame, Southern Turkey was located in a high latitude of east Gondwana setting ~60° S of the equator, and was subjected to the effects of the Late Ordovician (Hirnantian) glaciation. Uppermost strata of the Bedinan Formation comprise 30m thick cross-bedded sandstones probably tidal in origin, which are truncated by the glaciation-related deposits. In the subsurface, an additional, essentially shale-prone succession of upper Katian to Hirnantian age is identified beneath the glacial-related deposits.