

Petroleum Systems of the Zag Basin, Morocco

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Covering an area of more than 200,000 km² and occupying parts of Algeria, Morocco and Mauritania the Zag Basin remains one of the largest prospective frontier basins in North Africa. Exploration drilling took place between 1959 and 1971, based upon surface geology and a few lines of single fold seismic data. Drilling density in the basin is extremely low with an average of only one well in 13,000 km². Extensive geological field work, the application of modern technologies and innovative exploration by Petro-Canada, in partnership with ONHYM, have led to a re-evaluation of the petroleum system.

The Zag Basin is one of three large, intra-cratonic basins (Reggane, Taoudeni, Zag) developed on the West African craton. These basins are filled with sediments ranging in age from Infra-Cambrian to Late Palaeozoic. The Zag basin has an almost complete sedimentary section from Infra-Cambrian to Late Carboniferous (Stephanian), overlain by a thin veneer of Cretaceous sediments.

There is good evidence to indicate the presence of a viable hydrocarbon system; over 60% of wells drilled reported shows of oil or gas, and several recovered hydrocarbons from open-hole tests. Silurian and Late Devonian shales occur at outcrop in the northern part of the basin and have proven source rock potential. At least four potential reservoir intervals occur within the Ordovician, Devonian and the Carboniferous; these are capped by regionally extensive shale seals. A number of large, long-wavelength, low-amplitude folds have been identified at outcrop. These structures have the potential to yield large volumes of hydrocarbons.

Recent studies undertaken by Petro-Canada and ONHYM show that the Zag Basin has a complex burial and thermal history, in common with the other western basins of North Africa (Ahnet, Timimoun and Reggane). Detailed basin modelling indicates that this basin has the potential for significant reserves of both gas and light oil.