

703787 Source Rock Characterisation of Sediments from the Tarfaya Basin and Adjacent Areas, Morocco

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Thermal maturity information has been compiled for the Tarfaya Basin, Morocco and surrounding areas. Tarfaya Basin is bounded by the Anti-Atlas, the Reguibat High / Tindouf Basin and the Mauretania and developed since the opening of the Atlantic in the Permian to Triassic with continental extension. Little is known about source rock potential in Tarfaya Basin, excluding Cenomanian/Turonian black shales which were investigated e.g. by Kolonic et al. and Kuhnt et al. in great detail. In general Lower Silurian, Upper Devonian, Lower Jurassic, Lower Cretaceous, Albian, Cenomanian as well as Lower Tertiary shales are considered as source rocks. To get more information about their potential, cuttings and cores from on- and offshore wells as well as outcrop samples covering a large area (locations in Tarfaya Basin, Tindouf Basin and Bas Draa area) were collected. TOC/TC and sulphur measurements, Rock-Eval pyrolysis, vitrinite reflectance measurements and organic-geochemical analyses were carried out on these samples to get basic information on their thermal maturity and the potential to generate hydrocarbons. Based on these data the burial and thermal histories of several wells/pseudo-wells were modelled using PetroMod 1D. The modelling results lead to the conclusion that in some areas highest temperature was reached at recent times in accordance with deepest burial. The reconstructed temperature history shows moderate heat flow, excluding times of rifting at present. The present day heat flow was modelled with values between 50 and 60mW/m². In other areas, strong erosion took place and diagenetic paleotemperatures exceeded present-day temperatures by far.

High TOC values were established for Eocene sediments in the southern part of the Tarfaya Basin (up to 7%). In the Santonian, Coniacian and Campanian TOC values range between 1 and 6% and are even higher in the Cenomanian/Turonian black shales. Most of the samples are representing a type-II kerogen, whereas some of the Eocene samples contain type-I kerogen. Maturity of the samples is low, i.e. they are immature or at the beginning of the oil window. Tmax values range between 400 and 450°C and Production Index is lower than 0.1. Furthermore molecular geochemical data provide a more specific overview about the depositional environment and the maturity distribution.

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