

Application of 2d Basin Modeling for Evaluation of Petroleum Potential of Outer Part of Hazara-Kashmir Syntaxis, Sub-Himalayas

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One of the most logical ways to understand risk in frontier hydrocarbon exploration is to assess presence of effective source rock and hydrocarbon volume generated and expelled in an area. In addition to understanding these phenomena, basin modeling can address key questions related to maturation timing, transformation, migration and accumulation of hydrocarbons by considering geologically plausible range of thermal and geochemical parameters. Understanding thus gained may help to identify critical risk elements in a petroleum system context, which in turn, can provide proper risk mitigation measures.

Outer part of Hazara-Kashmir-Syntaxis (HKS) has been selected for hydrocarbon prospectivity evaluation as it is still unexplored and located just to the east of prolific Potwar Basin (Pakistan). Literature review suggests presence of similar structural framework and Paleogene stratigraphy in HKS as that of Potwar Basin where Paleocene-Eocene petroleum system is producing oil and gas from a number of fields e.g., Pindori and Balkassar.

In this study, 2D basin modeling was performed by considering different geochemical and thermal parameters appropriate to the geological setting of HKS area along a structural cross-section prepared by using existing geological maps and relevant subsurface information gained from Potwar Basin well data. The results of the study are intriguing from an exploration standpoint and suggest hydrocarbon generation, expulsion and migration from Paleocene Patala source rock during Neogene time. A Pliocene migration event is recognized as being synchronous with major structuration in the area, which is conducive for hydrocarbon accumulation in Eocene carbonate reservoirs. Results of the study support presence and validity of working of Paleocene-Eocene petroleum system in outer part of HKS.