



17th Workshop of the International Lithosphere Program ILP-Task Force VI on Sedimentary Basins

(5-6 December 2023) – Abu Dhabi

NEW INSIGHTS INTO THE PETROLEUM SYSTEM OF THE FOLD-AND-THRUST BELT OF THE UNITED ARAB EMIRATES

Ahmed Abdelmaksoud¹, Mohammed Ali¹, Aisha Al Suwaidi¹, Hemin Koyi¹

¹ Department of Earth Sciences, Khalifa University of Science and Technology, Abu Dhabi,
UAE.

ABSTRACT

The hydrocarbon potential of the fold-and-thrust belt (FTB) in the United Arab Emirates (UAE)-Oman mountains has received limited attention, leading to a poor understanding of the petroleum systems in this region. Despite the existence of hydrocarbon fields within the FTB, the source of these hydrocarbons remains elusive, and the potentiality of source rocks has not been adequately explored. This study aims to address this knowledge gap through the application of 1D and 2D basin modeling techniques to evaluate the petroleum system of the FTB. Additionally, gas chromatographs are used to correlate hydrocarbon occurrences with their respective source rock origins. Our findings identify the Silurian, Upper Cretaceous, Paleocene-Eocene, and Oligocene formations as the primary source rocks in the study area. Silurian shales, encountered in a well situated in northern UAE, are currently considered overmature. The Late Cretaceous and Cenozoic source rocks exhibit varying degrees of maturity, depending on their location relative to the FTB and foredeep, with maturity increasing towards the north. The present-day distribution of maturity is largely influenced by Late Cretaceous and Oligocene-Miocene compressional events that affected the northeastern Arabian Plate. Hydrocarbon expulsion from the Silurian source rocks was initiated during the Middle-Late Jurassic. These hydrocarbons are presumed to have migrated through Upper Permian, Jurassic, and Lower and Middle Cretaceous reservoirs. Westward migration may have also occurred following compressional events that resulted in lithospheric flexure and the formation of the foreland basin. Notably, certain exceptions to westward migration include structural entrapment of hydrocarbons beneath the main frontal thrusting of the UAE-Oman mountain belt and some traps beneath the Lower Fiqa Formation. Hydrocarbons generated from the Lower Fiqa Formation migrated to the overlying Juwaiza Formation and are sealed by the Upper Fiqa Formation.

Corresponding Author: Ahmed Abdelmaksoud, 100057572@ku.ac.ae