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Geophysical Evaluation of Hydrocarbon Potentiality of a Sedimentary Basin: A Case Study using Petrel Software

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Petrel Software is a powerful tool used to construct and simulate petroleum reservoirs and potential hydrocarbon traps. This integrated study uses more than 200 2D available Seismic lines and electrical well logs obtained from the available nine drilled wells in the study area. The main objectives of this study are to evaluate the hydrocarbon potentiality of the area through analysis of the available dataset and identify key uncertainties and their impact on the development of the area. Horizons and faults interpretation were carried out; Seismic attributes and other seismic processing techniques were used. Establishing a complete set of time and depth maps for specific reservoirs, source and seal intervals for evaluation and geologic correlation of the available wells. Exploration of the most hydrocarbon prospective areas for future drilling was highlighted and petrophysical modeling was constructed. Finally, risk assessment and priority list of prospects have been recommended. The main results of this study summarized that, Potential structural (horsts and half grabens), stratigraphic traps could be identified (Four leads have been highlighted and studied), several faulted four way closures structures and several unconformity surfaces, which may constitute stratigraphic traps. In addition, reservoir pinch-outs and onlaps, which are stratigraphic features, contributed to hydrocarbon potentiality. Vertical and lateral distributions of porosity and permeability are highly variable and least certain fact that effect reservoir quality. Seismic attributes and petrophysical modeling may indicate that reservoir quality may be significantly better than expected in particular localities. Certain Source rocks identification and evaluation. Uncertain variable permeability due to diagenetic effects. Uncertain sealing quality due to high porosity of claystone and shale may be considered as another risk leads.

Keywords: Geophysical evaluation, Hydrocarbon potentiality, Petrophysical modeling

Biography

Malaz Osman Ali Mohammed and Fatma Abdulla Mohammed Ahmad Al Tamimy are undergraduate students, working in Sure Plus Project in the department of Geology from United Arab Emirates University, UAE under the supervision of Dr. Amir Mohamed Amin Gabr.