

3D Petroleum Systems Modeling and Fluid Flow Analysis in the Great South Basin (GSB), New Zealand

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Abstract

This study uses 3D petroleum systems modelling and seismic interpretation approaches to investigate the links between hydrocarbon generation and migration with observed fluid flow features in the Great South Basin, New Zealand. Fluid flow features recording fluid expulsion at the seabed and paleo-seabed are manifested in this area as pockmarks and paleo-pockmarks which are found in at least three areas and stratigraphic levels 1) present-day seabed, 2) late Eocene and 3) middle Eocene. Other fluid flow features observed in this study area are polygonal faults, a bottom simulating reflection (BSR) and bright spots. Hydrocarbon migration pathways predicted by the model (Hybrid method) coincide with the interpreted polygonal fault system, pockmark, paleo-pockmark and BSR within the study area. This study highlights the value of integrating state of the art seismic analysis of fluid flow with quantitative 3D basin modelling to constrain petroleum systems of frontier basins.