

3D Fractured Basement Modeling based on 3D Seismic Attribute: A Preliminary Exploration Study of Hydrocarbon Potential in Basement Reservoir

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ABSTRACT

In Sumatra the discovery of gas in the fractured granitic basement reservoir has opened up the hydrocarbon potential of the pre-Tertiary basement play within the Jabung block and the surrounding areas in Indonesia's South Sumatra basin since Suban Gas Field on the Corridor Block, operated by ConocoPhillips (Grissik) Ltd. The Basement has successfully tested gas and condensate in NEB Base-1 exploratory well of Jabung Block located in the northern edge of South Sumatra Basin. It increases exploration confidence and minimizes risk of basement play in this region that might contribute significant impact for hydrocarbon finding from this new fractured basement play in future.

To identify high fracture density areas inside the granitic basement and its potential hydrocarbon accumulation, a preliminary G&G study and analysis of 3D fracture basement modeling based on 3D seismic attribute of Variance, Ant Tracking, 3D Most Positive Curvature, Envelope, and Sweetness specifically. Those attributes has been generated and correlated in order to find the best attributes which provided reasonable correlation with the well data. The geological model of fractured basement of NEB Field was generated based on seismic attributes and single well data (NEB Base-1) integration by using Neural network and Co-Kriging technique. An advanced workflow was used to predict fracture distribution, geometry, and orientation with well data calibration accurately.

The modeling result shows a good correlation with borehole image interpretation and seismic analysis. Seismic analysis has been done using seismic attributes which enhanced the resolution of fault and fractures images. The combination of well data and seismic attributes analysis has successfully detected the high fracture density areas and hydrocarbon accumulation potential in fractured basement reservoir area.