

# Reservoir Characterization Through Attribute-Aided Seismic Interpretation Along with Model Based Inversion for Porosity Computation Over a Gas Producing Pab Sandstone Reservoir Zamzama Field, Southern Indus Basin, Pakistan

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## Abstract

Seismic structural interpretation reveals that the Zamzama field structure is a single, asymmetric, thrust anticline. Reinterpretation of 3D seismic with the help of ant-tracking attribute application depicts pronounced structural variations and helps to understand the tectonics of the area. Structural framework models for Pab reservoir show a pattern of north-south oblique ramp thrusts developed on the southwest flank of the field. Easterly vergent thrusts and counter back thrusts create local areas of 'pop-up' structures. Fault models were analyzed and throw of the faults shows that the well on southwestern side had encountered an almost entire normal thickness of Pab section and rotation has occurred due to which it penetrated the vergent ramp thrust close to the top of Fort Munro horizon. Paleocene and mid Eocene formations are dipping westward as time in increasing in westward direction making it a deeper side. 3D seismic interpretation and application of ant-tracking for fault extraction identifies discrete structural styles and all thrusting has occurred as a result of compression in the Plio-Pleistocene. The apparent different styles are a result of reactivation of earlier extensional

fault systems and probably phased periods of compression. Structural interpretation along with well data were used for model-based inversion which provides impedance by means of deterministic approach. In order to get absolute acoustic impedance low frequency model was added and inversion analysis was performed. Impedance values for a good quality gas reservoir ranges from 8000-10000 (m/s) \*(g/cc). Impedance results indicate the low impedance at well drilled on southwestern side and low porosity reservoir is characterized by high impedance values approximately ranging from 11000- 14000 (m/s) \*(g/cc). Regression analysis was performed on impedance results to get porosity distribution across the reservoir. High porosity sands are present in south-west direction, whereas high impedance at north-east shows a presence of low porosity sands. Porosity estimated from inversion gives indication of porosity distribution over the high-resolution impedance derived seismic data and identifies high porosity sands in south-west side and low porosity sands towards north-east.