Integrated Seismic Interpretation and Attributes Analysis for Prospect Identification of Ratana Area, Northern Potwar

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Abstract

Reflection seismic method is widely used to map subsurface structural heterogeneities to certain limits. Seismic reflection data is integrated with Petrophysical well log data to mark subsurface heterogeneities with more accuracy and to analysis the reservoir characteristics of Ratana area, northern Potwar, Pakistan. Ten 2D seismic lines and complete sets of wireline logs of three wells are used in this study. The integrated study involves; structural interpretation of seismic data, time to depth conversion and generation of depth sections, synthetic seismogram, and rock physics modeling. The limestone of Chorgali Formation is interpreted as reservoir rock. Seismic interpretation revealed that the study area lies in compressional regime and structures formed are thrust and popups. After identification of various lithologies from seismic lines, the reservoir properties such as lithology, porosity, permeability, depositional environments, shale volume, fluid saturation, net pay thickness are determined from well logs and rock physics. Petrophysical analysis confirms that porosity and permeability decreases along depth with increases in density. Reservoir characteristics of limestone reservoir are enough to permit hydrocarbon production. Gassmann;s equation is used for fluid replacement modeling in the reservoir zone and various rock physics attributes such as compressibility, Lame's parameters and their product with density, P to S wave velocity ratio, impedances and Poisson's ratio are computed as a function of pore fluid type (oil, gas, brine). Crossplots of appropriate attributes demonstrate that the products of Lame's constant with density and impedances are more sensitive to pore fluid and discriminate the gas, brine and oil facies more robustly.