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Reservoir Characterization by AVO Analysis: A Case Study in X-Block Doba Basin, Chad

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Amplitude variations with offset (AVO) is a valuable tool for extracting fluid and lithological information from seismic data, thus aiding in reservoir prediction. AVO analysis may be facilitated by the cross plot of AVO intercept (A) and gradient (B). Under reasonable geologic circumstances, A and B for brine saturated sandstone and shales follow a well-defined "background" trend. Deviations from this "background" trend may indicate the presence of hydrocarbons. Although an exploration well confirmed the presence of a 48m net pay oil, uncertainties lies within the hydrocarbon accumulation of X-Block. This study aims to delineate the lateral distribution of hydrocarbon accumulation in X-Block using AVO analysis. Integration of existing well logs, seismic and all other related data will be used to discriminate the oil reservoir from seismic section. The end results show the target reservoir in X-Block displays a strong Class II AVO anomaly at the area of interest. AVO attribute horizon data slices of scaled Poisson's Ratio change and scaled S-wave reflectivity successfully delineated the lateral extent of hydrocarbon accumulation in X-Block. Further full spectrum in- depth studies on quantitative interpretation such as pre-stack seismic inversion may be done to increase the validity of performed analysis and the level of confidence for hydrocarbon exploration in X-Block.

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