

Application of Seismic Attributes in Delineation of Channel Features in Rence Field of Niger Delta, Nigeria

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Abstract

Multiple seismic attributes were used in the delineation of channel features in Rence Field of Niger Delta, Nigeria. The study aimed at seismically defining the geometries of hydrocarbon reservoirs with particular emphasis on channels in the shallow offshore Niger Delta. The application of seismic attributes would display superior images of the channels because multi-attribute improves imaging of geological structures and strongly defines the depositional environment. The result of the seismic facies analysis shows that the Rence Field can be distinguished into layered complexes and chaotic complexes seismic facies. The result of well to seismic ties reveals high and low amplitude reflection events for sand and shale units respectively. Rence Field is structurally defined by four regional faults and twelve minor faults comprising of antithetic and synthetic faults. One mega-channel running in transverse direction to the basin dominates the stratigraphic landscape around the field. This channel future is characterized by sinuosity of 1.3, with a length of 22500 m, and a distance of 17500 m. The average depth of the channel is about 170 m with amplitude of 1670 m, and wavelength as high as 7640 m. A depositional model generated from the attribute maps indicates a sub-aqueous channel environment of deposition. The petrophysical analysis of the well data shows 90% Net-to-Gross, 28% porosity, 27% volume of shale, and 24% water saturation indicates that the reservoir is of pay quality. Based on the petrophysical analysis, results, and identification of channel deposits, the study area proves highly promising for hydrocarbon exploration.