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Neural Network of 3D Seismic Attributes - An Investigation Methodology of Gas Chimneys in Dorra Field, Middle East

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Abstract

Seismic chimney anomaly is an important stride, as it is one of the key hydrocarbon indicators of petroleum exploration. In its strict geological sense, seismic chimneys are migration path ways, progressing towards structurally up-dip areas within a proven petroleum system. Time horizons and seismic amplitude attributes derived from 3D seismic datasets, recently find an application in exploring foot-prints of lateral and vertical movement of hydrocarbons along steep-dip faulted zones and at places, where they are surface exposed, thus gas chimneys formed. 3D seismic data of 304 sq. km. acquired over the field have been considered with number of key wells, used for calibrating the seismic chimney signatures. High amplitude seismic anomalies, calibrated in the wells, are interpreted to have been associated with gas chimneys within a Cretaceous sequence. To identify and examine these chimneys from seismic cubes, an integrated work-flow is tested using neural network technology.

The seismic chimneys not only provide knowledge of vertical migration of hydrocarbon fluids but, indicative of hydrocarbons movement among different geological sequences. Tracking and mapping of seismic chimneys in between potential reservoirs facilitate to establish migration routes and also shallow petroleum prospectivity. Present study provides an accurate mapping of gas chimney, which has significance even in evaluating shallow gas hazards of drilling. Surface areas identified as gas chimneys, responsible for migration routes of fluids (besides, examining non-favorable conditions for seabed installations), are expected to be good logistics for field development project of the study field.