Velocity for Pore Pressure Prediction Modeling and Risk Assessment

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ABSTRACT

Prediction of pore pressure using seismic velocity (Vp) before drilling and sonic slowness (Δt) in real-time and after drilling are vital for the entire prospect's economic appraisal. The progressing subsurface geological process in clastic sediments, from deposition and compaction to entrapment greatly impacts the pore pressure partitions. In fluvial and deltaic marine environments, velocity, as a porosity index, drifts as a consequence of these subsurface partitions. The contemporary velocity–pore pressure transformation models are lacking this relationship, especially in the so-called normally pressured section.

The supposition that the section above the top of geopressure is normally pressured can lead to drilling challenges such as shallow water flow and the flow-kill-loss of circulation cycles. Moreover, it is controversial to consider the shallow section as normally pressured and at the same time extract a compaction trend to be used for deeper overpressure modeling. The purpose of this study is to establish the velocity-pressure modeling alliance in the shallow section and furthermore apply the correct algorithm's calculation to the deeper section below the top of the geopressure.

The appropriate interval velocity-depth profile can shed light on the subsurface seal's competency in a prospect. Moreover, defining the different pressure subsurface zones using velocity can help in assessing the economic feasibility for the proposed wildcat ahead of the drill bit.

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