Using Seismic Velocity and Attributes to Predict Formation Pore Pressure in the Offshore Frontier Area

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Abstract

A predrill prediction of formation pore pressure is critical for the safe and economic matters. In mature oil and gas producing areas, the approaches for pore pressure prediction are flexible due to various existing well logging and test database other than seismic data can be acquired, the predicted results can be verified each other and usually consistent with the reality. However, in the frontier areas, especially offshore sites, well data appear significantly rare because of the limitation of drilling technologies and overspending, thus seismic data are relatively paid much more attention to predict geopressure. Using seismic velocity to investigate the unknown geopressure distribution is the traditional techniques in these areas, conventional methods are based on the empirically observed relationship between effective stress and seismic velocity, the results may be affected by universal factors and exist ambiguity, the paper attempts to search or induct some seismic attributes parameters, which will expel ambiguity and verify the result's reliability if these are sensitive to overpressure. The study area is a frontier area which is located on the northern end of the Myanmar blocks, and the sequence is dominated by clastic rock, the unique well drilled in this area has encountered exceeding high overpressure in Miocene, The empirical method of Eaton is used based on wireline acoustic logging, meanwhile, the equation's parameters is micro adjusted through the correlation of the computed result and measured DST data, The results are mostly matched with DST data of the existing well, then it is used based on wellbore seismic velocity, it is proved that the two pore pressure curves by means of well and seismic velocity are

approximate, but the sonic-velocity-based one is more accurate. Seismic multi-attributes of target layers are extracted and filtered. It has been found that seismic attributes relate to frequency are sensitive to predicted overpressure. Generally, overpressure region is corresponding to apparently relative lower seismic frequency. Seismic velocity volume in block transforms formation pore pressure volume based on Eaton equation. Seismic frequency attribute expels ambiguity, overpressure distribution can be effectively predicted.

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