Seismic Direct Detection of Gas Accumulations in Fractured Reservoirs: Examples from Clastic and Carbonate Reservoirs

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ABSTRACT

In indurated rocks, like those common to interior continental basin, pore fluid prediction from seismic data is difficult because the change in compressibility of the fluids is completely masked by the overall compressibility of the rock structure. In contrast, for a geophysically fractured reservoir, detection of gas columns is often possible through azimuthally varying AVO and seismically derived interval velocities, which often also vary by geographic azimuth of seismic wave propagation. In this presentation, we will contrast and compare "geophysical fractures" and reservoir enhancing fractures. We will also attempt to petrophysically relate the role of the gas hydrocarbon column and its inherent pressure with seismic properties. Then, strategies will be proposed for direct detectability of gas saturation using seismic data. Finally, examples will be presented from a Cretaceous tight-gas clastic reservoir and from an Ordovician hydrothermally dolomitized limestone. showing how seismic data were used for fluid prediction / pressure prediction in fractured, indurated rocks.