GeoPressure 2015 Conference - 14-16 April

Geological and Processing Controls for a Successful Seismic Pore Pressure Prediction

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Abstract

Since the exploration for oil and gas is targeting frontier locations ever more commonly, the expectations on seismic velocity to produce an accurate seismic pore pressure estimate are increasing. While seismic velocity data can be used to estimate pore pressure in much the same way as from sonic (DT) or velocity (Vp) logs there are many more uncertainties. One such example arises when considering if a velocity reduction indicates a lithology change, fracturing, or overpressure. Whereas an answer could be relatively easily reached from the multiple parameters and measurements derived at a well, a seismic velocity reversal will require supplementary information from geological models and analogues to understand the cause. Two examples which can relate the likely experience of overpressure to the tectonic setting are accretionary prisms and compressional basins. In the former, the taper angle of the accretionary prism has been related to the overpressure of the underlying shales; with higher overpressure causing shallower tapers. Compressional basins show the highest overpressure where folding and faulting have occurred most recently. Essentially, seismic velocity data are only one form of information and for the purpose of seismic pore pressure prediction it should not be elevated beyond the levels of certainty it can provide.