

Combined Simultaneous Inversion and Ant Track Bring Valuable Insight into Field Development in a Tight Gas Reservoir

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In this South Texas onshore tight gas play, traditional geologic trend analysis and amplitude mapping showed mixed results when used to determine drilling targets. Our client wished to reduce drilling risk, and after consultation and feasibility testing, ISIS simultaneous pre-stack AVO inversion was applied to the dataset followed by LithoCube analysis and Joint Porosity Water Saturation inversion.

A local well log based compressional/shear transform was developed, rescaled, and used for this PP amplitude dataset. Although angle coverage at the target depth was insufficient for prediction of density, careful conditioning of angle gathers recovered sufficient angle range for prediction of Poisson's ratio and shear impedance. Low Poisson's ratio combined with low acoustic impedance matched the client's success criteria at blind test well locations.

After calibration to the specific interval under study, rock physics information derived from sidewall core analysis and well logs was used to transform the inversion results and predict sand, shale, and water saturation. When combined with Ant Track discontinuity analysis, a picture of nicely fault bounded gas accumulations emerged. One new well has been drilled in this prospect since the study, and another existing well was recompleted in a previously bypassed interval. In both cases, prediction of gas in the target sand was confirmed.