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Fracture Characterization in the Georgetown Formation (Central Texas) with AVO

The fractured Cretaceous Georgetown Formation has proven to be an attractive unconventional exploration and development target in Central Texas. Unfortunately, the fracture systems that determine well productivity are notoriously discontinuous, and the play to date has often been characterized by barely economic wells directly offsetting excellent producers. Fractured areas are very difficult to predict using conventional geological or geophysical techniques. A conventionally-processed 3-D seismic survey acquired over an area of known Georgetown production yielded little additional insight into the location of productive fractures within the Georgetown. However, anisotropic seismic modeling indicated that an azimuthally-varying AVO response should be visible from the Georgetown where it is fractured. This seismic fracture signature is most apparent on the azimuthal AVO gradient term.

Armed with this new insight, the 3-D seismic data were revisited and reprocessed for AVO analysis. Although the poor azimuthal distribution of the survey made rigorous azimuthal AVO analysis difficult, examination of AVO gradient stacks indicated a good correlation between gradient strength and Georgetown well production. This result provides encouragement that 3-D AVO analysis can be used to target the most heavily fractured and productive areas of the Georgetown and significantly improve play economics.