To drill or not to drill: Seeking untapped thrust-fault structures using 3D ADM in Blackstone, Alberta

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ABSTRACT

A producing natural-gas field in the foothills near Blackstone, Alberta is thought to have undrilled Mississippian carbonate thrust sheets that may represent incremental reserves. These thrust sheets are inferred from well data but are not imaged clearly on the 3D prestack-time-migrated seismic data.

3D anisotropic depth migration (ADM) was pursued on a subset of the data volume over this field with the hope that correcting for seismic anisotropy and lateral-velocity heterogeneity in the clastic overburden would enable better imaging of subtle thrust faults in areas of poor time imaging to enable exploitation of these potentially undrained fault imbricates.

We interpreted the anisotropic velocity model using a layer-stripping approach from the surface down to the crystalline basement, including the dip and strike of our anisotropic layers in our velocity model. We then migrated this data volume using 3D ADM.

The resulting ADM volume shows significant imaging improvements in the target events, imaging steeper dips and sharper reflector terminations than the 3D prestack time migration. These changes in imaging resulted in an alternate interpretation of the thrust-fault structures.