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Structural Mapping of the Vinton Salt Dome, Louisiana, Using Gravity Gradiometry Data

Chris Ennen

Seismic imaging of complex faulting and associated petroleum reservoirs adjacent to onshore salt domes in the Gulf Coast region is both expensive and time consuming. Modeling studies show that gravity gradiometry data have the resolution to image such reservoirs where seismic is unavailable or cost averse. Full Tensor Gravity Gradiometry (FTG) data, which are higher resolution than conventional gravity data, have been acquired by Bell Geospace over the Vinton salt dome located in southwest Louisiana. Overlays of interpreted faults and a contour map of the areal extent of the salt on top of each component of the gravity gradient tensor show strong correlations useful for mapping structural elements of the dome.

Interpretations of the Vinton salt dome are used to construct a detailed subsurface salt model. Forward models of the main counter regional fault and the caprock of the dome were built and used to compute the signal associated with those features to test their expression in the measured gradient data. Structural interpretation shows the main fault has a small expression in each of the gradients that is not easily discerned in the measured data. High density caprock exhibits strong signal on each component of the gradiometry data that can be used to map edges and locate the center of mass. ■

Enhancement of Geological Features on Barnett Shale by the Application of Spectral Decomposition and Spectral Inversion, Shackleford County, Fort Worth Basin, Texas, USA

Lorenzo Izarra

Using Spectral Decomposition and Spectral inversion concepts it is possible to go beyond seismic resolution and get results that can be interpreted more objectively and accurately on the Barnett Shale in the Fort Worth Basin. This research focused in applying spectral decomposition and spectral inversion on a 3D seismic data from the Shackelford County, Texas, USA, to define stratigraphic and structural elements that cannot be seen with conventional seismic data.

It is shown that spectral decomposition and spectral inversion helped identify faulting patterns, also, proved to be a powerful tool to identify carbonate features on this part of the Barnett Shale region.

The combination of frequency cubes on a RGB color coded helped to identify more accurately and faster the presence of these geologic elements.

Uses of these techniques improved the vertical resolution from 115 ft. to 50 ft. in this area leading interpreters to understand the characteristics of the Barnett Shale in terms of seismic signature including faulting and fractures that are bellow seismic resolution. ■

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