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3D fault drag characterization: an import tool in a fault description

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Using an industrial 3D seismic dataset from the central part of the Vienna Basin (Austria), we investigate marker horizons in the hanging wall and footwall of a large-scale normal fault. The throw of individual horizons shows a remarkable variability, both along strike and along dip of the fault. Since fault drag is a direct function of the displacement gradient quantification of this large scale fault drag allows identification of linked individual fault segments constraining the fault evolution.

The investigated Markgrafneusiedl fault, crosscutting the Miocene sedimentary succession deposited from Carpathian up to the Pannonian age, represents the southeastern border of the Matzen oilfield. At depth, the Markgrafneusiedl fault displaces seismic horizons up to the decollement level, with a maximum throw of $\sim$300 m.

In order to visualize the three-dimensional distribution of fault drag throughout the seismic volume, six stratigraphic horizons were mapped in detail using the software package Seisvision (Landmark). An accurate stratigraphic correlation was achieved by integration of exploration well data located within the 3D seismic block. In order to document a greater number of marker horizons for the analysis of fault drag, the most distinctive seismic reflectors have been mapped throughout the entire cube in addition to the six well-documented formation tops. All horizons were mapped in TWT.

Using the 3D modeling software Gocad (Paradigm), the mapped horizons tops were depth-converted, applying a generalized equation assuming an exponential increase of seismic velocity with depth. This conversion should ensure a better geometric representation of the fault drag geometries, which cannot be extracted from time-sections. The additional documentation of fault drag permits a more detailed identification of individual fault segments, which cannot be achieved by using conventional parameters, such as fault dip, azimuth and throw.