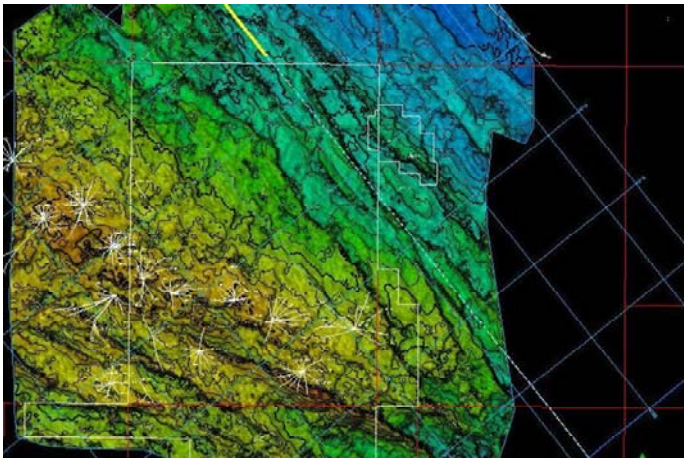
Case Study:
Regional Fault Identification

Background

Perenco, a European petroleum, exploration and production company approached ffA for an in-depth analysis of a large dataset (580 km²), taken from the southern North Sea, with extensive and highly complex faulting. The aim was to identify different fault types within the data, in particular the “De Keyser”* faults and within a short time frame.

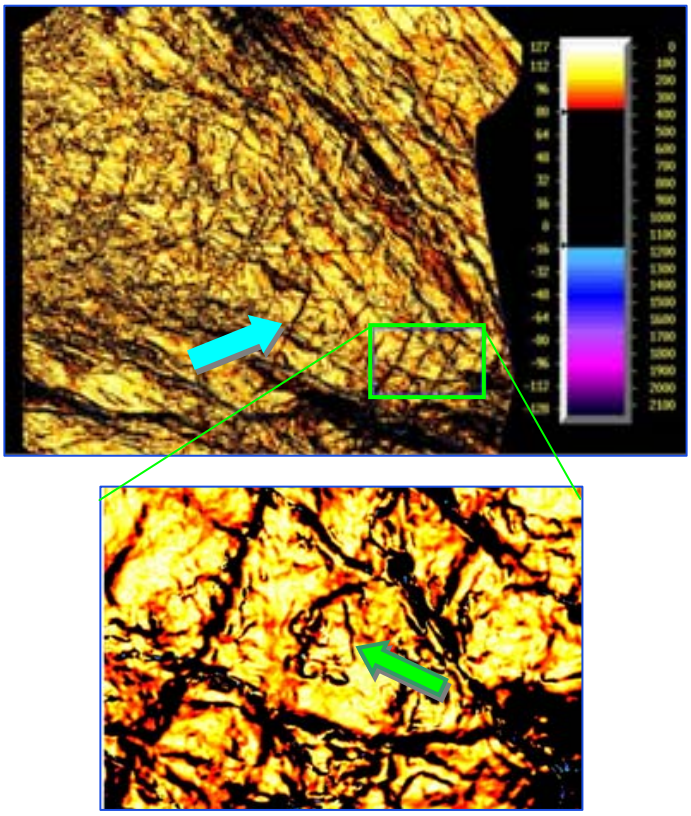
Workflow



Using **Noise Cancellation** techniques, an accurate and detailed Top Rotliegendes horizon was created to identify the faults. The horizon highlighted clear regional faults but poor “De Keyser” lineaments. (“De Keyser” is a term used by Perenco to describe the parallel running faults).

Top Rotliegendes horizon picked on the noise cancelled volume

Results



To obtain a more thorough understanding of the “De Keyser” lineaments, ffA’s volumetric Structural Imaging algorithms were run on the Noise Cancelled data. When the **Dip Volume** was displayed on the Top Rotliegendes horizon, the faults, especially the “De Keyser” lineaments became much more prominent.

Dip volume displayed on the Top Rotliegendes horizon. The arrow points to the De Keyser faults

The **Dip Volume** also identified depressions caused by the presence of Halite (rock salt) in the Lower Zechstein. These were seen as circular areas of high dip within the fault blocks.

Enlarged display of the Dip volume on the Top Rotliegendes horizon. The arrow points to the depressions caused by Halite.

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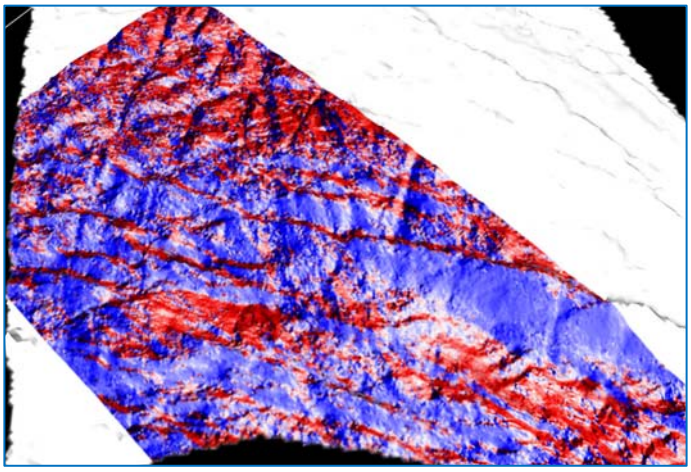
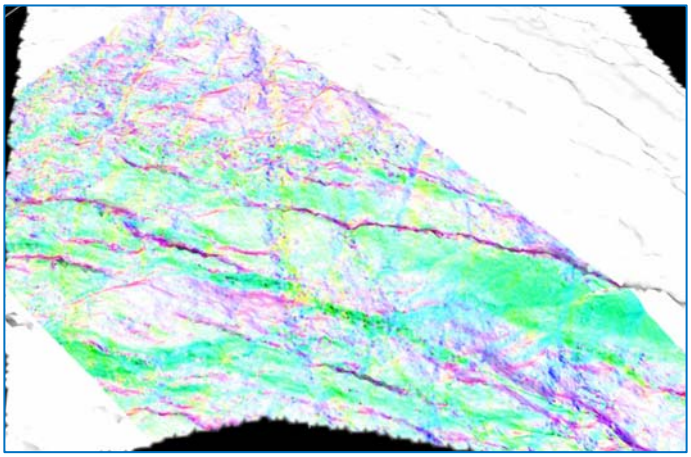
As part of the 3D Structural Imaging workflow, two additional attributes were created. The **Azimuth** and **DipAzi combined** volumes which provide more information on regional and detailed structural features.



The **Azimuth Volume** displays the orientation of the dip of the reflectors. When displayed on the top Rotliegendes horizon, the axis of the faults were visible by the noticeable colour change. The **Azimuth Volume** also highlights clear "De Keyser" lineaments as well as the main region faults and subtle flexures in the data.

Azimuth volume displayed on the Top Rotliegendes horizon



The **DipAzi combined Volume** is a composite of both the Dip and the Azimuth information. It highlights faults expressed by sharp discontinuities and gentle flexures. Perenco concluded that the **DipAzi combined Volume** produced clear results for identifying all fault types.

DipAzi combined volume displayed on the Top Rotliegnedes horizon

Conclusions

"ffA's Dip and Azimuth attribute volumes, combined with a continuous Top Rotliegendes seismic surface, significantly facilitated mapping of subtle lineal elements known to affect fluid compartmentalisation in this part of the southern North Sea gas province. In addition, ellipsoidal seismic artefacts related to the occurrence of halite pods in the lowermost Zechstein overburden became apparent".

Hugo Swanenberg, Perenco

Availability

ffA's Structural Imaging workflow is available through
ffA Services or within ffA's Software: SVI Pro and SEA 3D Pro