Improving the Quality of Transition Zone 3D Data in Northwest Germany

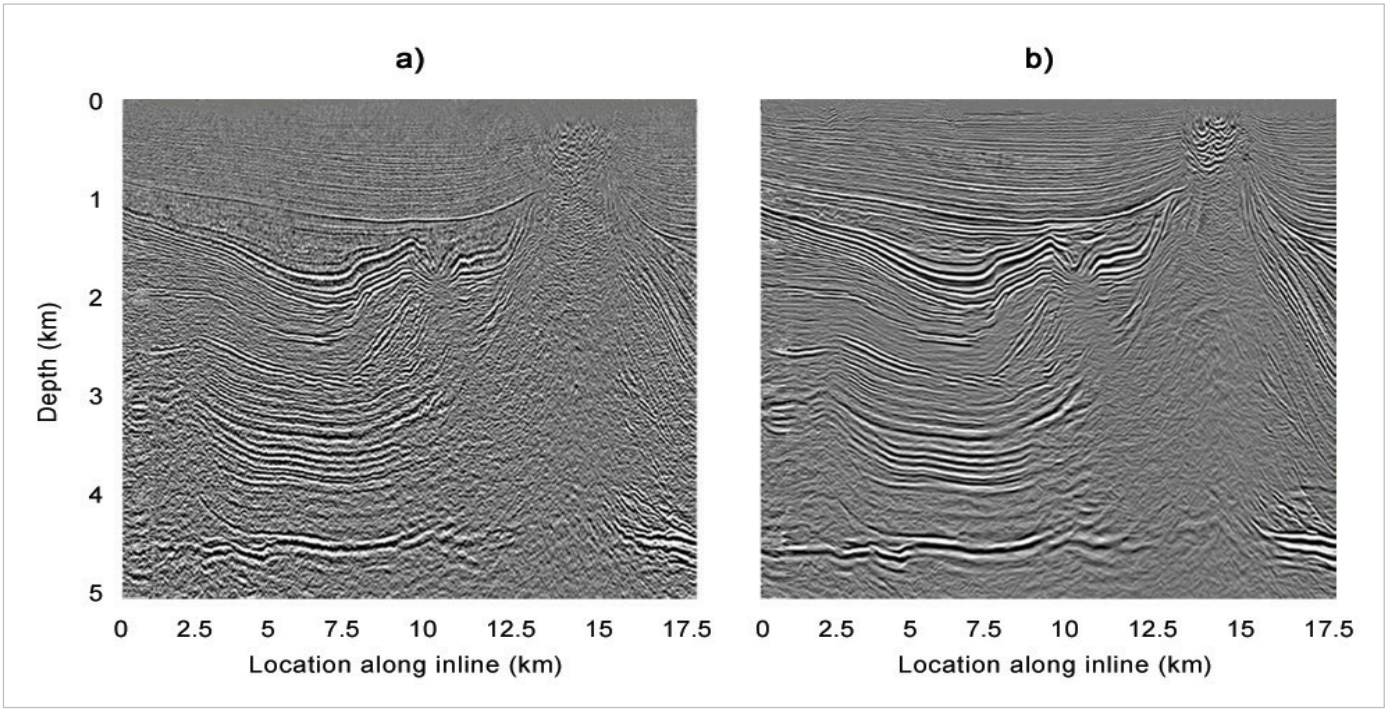
The Challenge

The goal in this case was to improve the quality of subsalt imaging using data acquired in a marine-land transition zone in Northwest Germany (owned by RWE-DEA AG and Wintershall AG). The data was sparse and of low quality.

The Solution

The unique ability of EarthStudy 360® to separate out the specular energy containing information about the continuity of coherent events by creating three-dimensional, continuous full-azimuth directional angle gathers, and to perform specular energy weighting imaging, provided a much clearer picture of the salt flanks and the reflectors below the salt.

The figure below shows two depth migrated sections from 3D data following the creation of directional angle gathers. The lefthand figure shows the direct stack of the directional angle gathers, while the righthand section shows the specular energy weighted stack of the same gathers. The high energy values associated with the specular directions sharpen the image of the structure, and the improvement in the continuity of the structural information throughout the volume is clearly seen in the section on the right.



a) Directional angle decomposition followed by normal (no weighting) stack

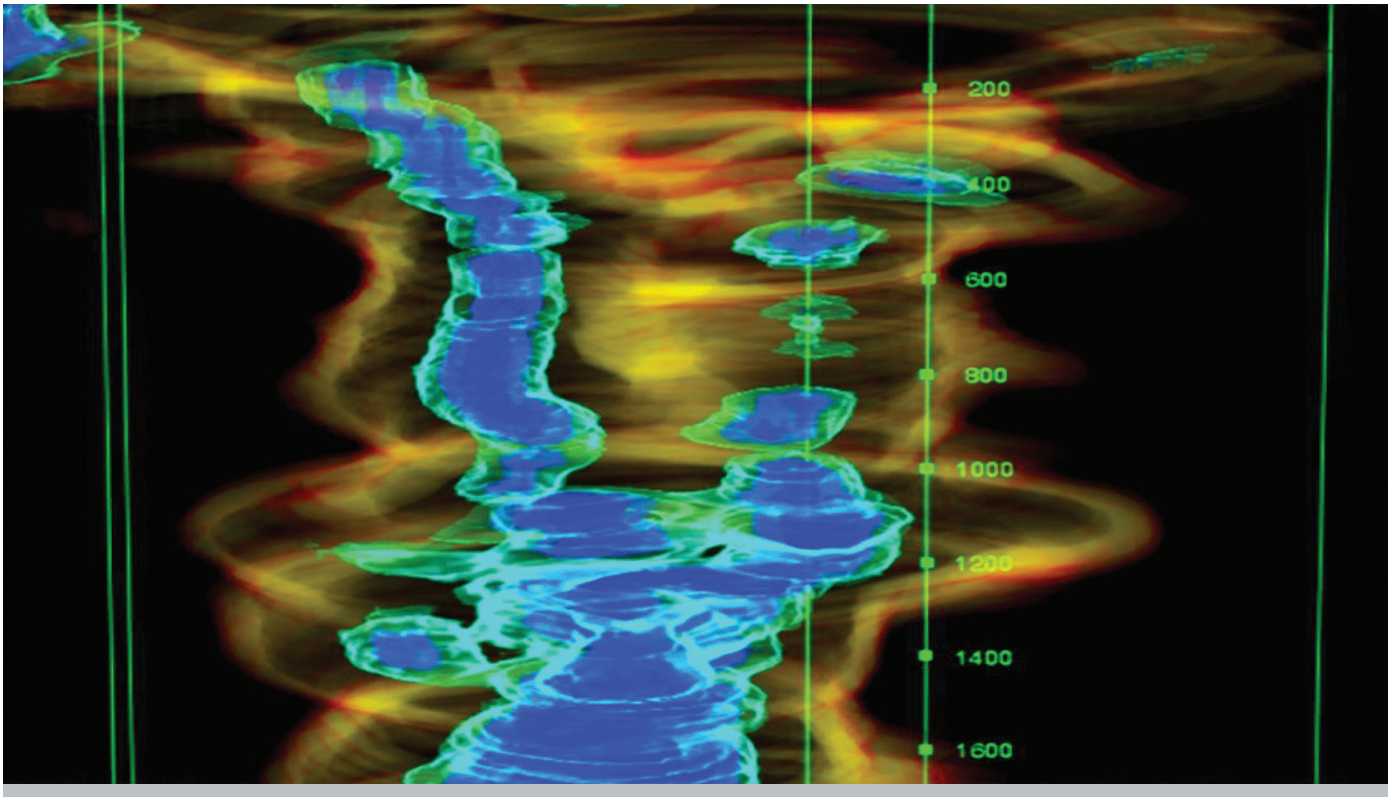
b) Image in the same area with specular energy weighted stack applied

The following figure is an example of a directional angle gather in the vicinity of the salt. Two areas of specular energy are clearly visible, indicating subsurface points which are in the vicinity of conflicting dips, such as unconformities and pinchouts.

The results show that the single directivity is not always true, and we must consider all energetic directions in areas affected by difficult tectonics and a complex overburden.

The Conclusion

As a result of using EarthStudy360 on existing, low-quality transitional data, the subsurface image obtained was sufficiently detailed to define and assess potential drilling targets. This freed the customer from the need to acquire new 3D data to improve imaging resolution in the environmentally-sensitive coastal area of NW Germany.



▲ Directional angle gather along pinchout: Two different specular directions at the same depth level