

## **A Southern North Sea Multi-Survey preSDM using Hybrid Gridded Tomography**

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### **Abstract**

Exploration in the Southern North Sea using conventional imaging techniques is hampered by complexities in the Mesozoic overburden and the Zechstein evaporites with dolomitic rafting overlying potential targets. 3D preSDM imaging has come into widespread use in recent years, in an attempt to resolve such problems.

Here we present case history from the ConocoPhillips acreage over block 49/14a, where a four survey merge covering some 430sq.km was reprocessed to yield a coherent single input volume for 3D preSDM imaging.

Hitherto, a layer-based model building approach has been commonly used for North Sea type environments, where sedimentary interfaces delimit changes in the velocity field and the geology 'lends itself' to a layer-based model representation.

However, recent work in the North Sea has demonstrated the advantages of removing the constraints of a simple layer-based solution, so as to permit a gridded tomographic approach to uncover the more subtle lateral changes associated with variable chalk compaction regimes. In addition, the rapid vertical velocity variation associated with chalk and salt interfaces which do profit from an explicit layered velocity boundary, are addressed by incorporating layer constraints in the gridded model to produce a hybrid gridded tomographic solution.

With this in mind, we have opted here to use a hybrid gridded tomographic approach for the model building. As with any tomographic solution, the key to success lies in having very dense picking of reliable input data, with appropriate constraints. We employed dense continuous automatic picking of residual moveout in CRP gathers at each iteration, based on plane-wave destructors, followed by gridded tomography, resulting laterally in a smoothly varying velocity field. This approach offers the possibility of quicker model update, as we do not need one preSDM iteration for each 'layer' in the model. The resulting images show good resolution of the Zechstein and Rotliegendes section, much improved on vintage processing, and good well ties.