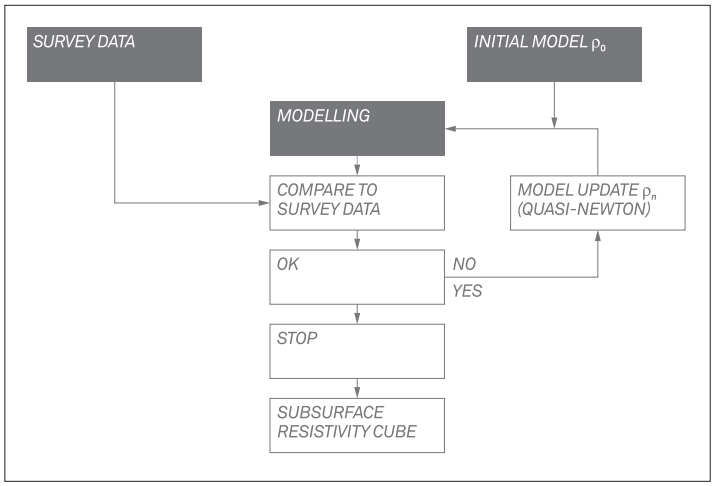
Clearplay

INTEGRATED EM SYSTEM
FIND / TEST / EVALUATE

3D INVERSION



01

02

01
Inversion workflow used in 3D inversion. Modelled data is generated from an initial resistivity model and compared to the observed data. In an iterative process the model is updated until satisfactory agreement between modelled and observed data is obtained.

02
Aurora, the most powerful EM processing centre in the world, enabling advanced 3D EM inversion.

3D INVERSION PROVIDES DEPTH CONVERTED RESISTIVITY CUBES WHICH ENABLE COMPLETE INTEGRATION OF EM DATA WITH SEISMIC AND WELL LOGS. THIS GIVES EXPLORATIONISTS UNIQUE KNOWLEDGE TO INTERPRET THE SUBSURFACE ROCKS WITH RESPECT TO FLUID CONTENT. RESISTIVITY CUBES CAN BE CO-VISUALIZED WITH SEISMIC TO HIGHLIGHT PROSPECT AREAS AND ACCURATELY DELINEATE HYDROCARBON RESERVOIRS.

3D INVERSION ACCOMMODATES DATA ACQUIRED IN 3D GRIDS, WHICH IMPROVES THE FINAL RESULT SIGNIFICANTLY COMPARED TO TRADITIONAL 2D EM DATA. THE AVAILABLE WIDE-AZIMUTH DATA AND THE INCREASED DATA COVERAGE ENHANCE THE SPATIAL RESOLUTION AND ACCURACY OF THE FINAL 3D RESISTIVITY MODEL

Method

3D inversion handles both 2D and 3D data acquisition. It is ideal for 2D EM data with complex bathymetry variations and provides the ultimate advanced processing tool for 3D EM data with azimuthal information. The inversion can provide isotropic or anisotropic resistivity cubes.

The inversion itself is an iterative process where data computed by a 3D forward modelling engine is compared to the observed data. Subsequently, the resistivity model is automatically updated to reduce the misfit between the modelled and observed data. The gradient-based update loop is repeated until a satisfying agreement between observed and modelled data is obtained. This process is typically executed within 1-3 weeks on a large-scale computing cluster. The confidence in the final resistivity model is analysed and evaluated based on the final data misfit, and how well the results agree with other geological information from the area.

3D inversion is typically applied unconstrained. However, prior geological and geophysical knowledge may be incorporated in the inversion to yield an even better understanding of the subsurface geology. Usually such constraints are derived from seismic horizons and available well data.

03
Depth-converted resistivity volumes obtained by unconstrained 3D inversion. The model can be overlaid seismic horizons and prospects (illustrated by the black outline) to delineate potential hydrocarbon reservoirs.

04
Top reservoir slice through the 3D resistivity model. 3D inversion results delineate the reservoir as well as providing resistivity distribution of the fields. Resistivity logs confirm the results obtained by 3D inversion.

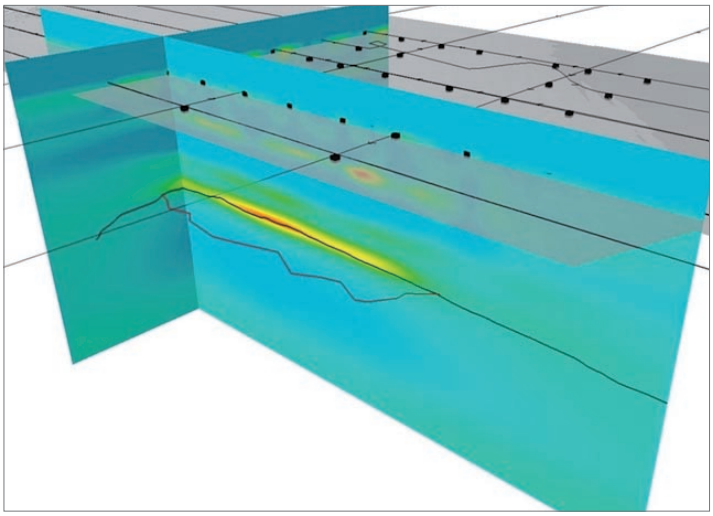
Results

3D inversion results provide a 3D resistivity distribution of the subsurface accurately placing high-resistive bodies both laterally and in depth. It can delineate prospects and discoveries which will contribute to fluid distribution and hydrocarbon volume estimates. The models are delivered as seg-y cubes ready to be uploaded into any interpretation software, which enables easy integration with seismic and well log data.

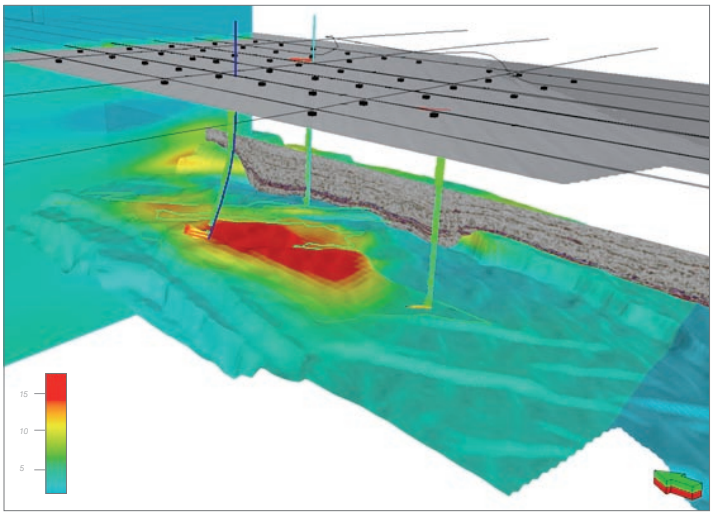
As a supplement to the resistivity model, the data misfit between observed and modelled data is provided to evaluate the results. Interpretation and refinement of the inverted resistivity model can be performed by 3D forward modelling studies, or by additional inversions using constraints formulated from an interpretation of the unconstrained inversion results.

Contact

To discover more about Clearplay, email clearplay@emgs.com, visit our website *EMGS.COM* or call your nearest office.



03



04

Key features

/ Includes TIV anisotropic and isotropic inversion.

/ Provides 3D resistivity-depth cubes.

/ Handles 3D EM data.

/ Utilizes both inline and azimuthal data.

/ Ideal for 2D EM data with complex bathymetry variations.

/ Can use constrains from external data such as seismic horizons.

/ Final resistivity models are delivered in seg-y format for easy integration into exploration workflows.

Data courtesy of StatoilHydro.