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Techlog 3D Petrophysics for High-Angle and Horizontal Wells

Extract full value from acquired measurements—to make interpretations you can trust

APPLICATIONS

- Petrophysical analysis in high-angle and horizontal wells

BENEFITS

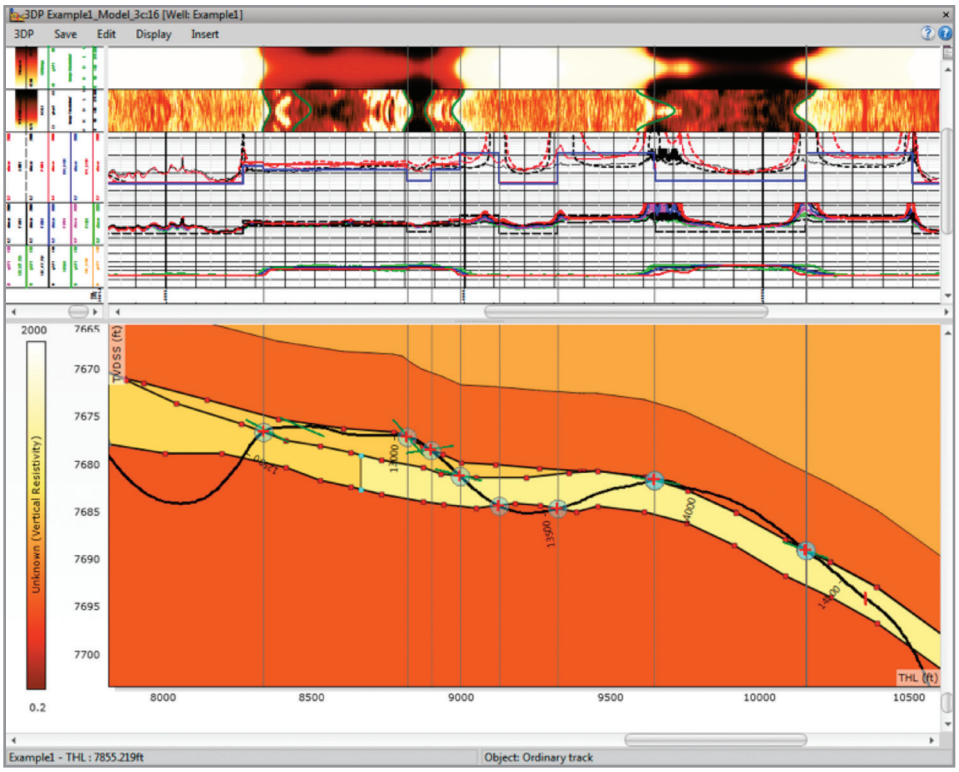
- Extract the full value from your acquired measurements
- Validate models of both subsurface geometry and formation properties

FEATURES

- Intuitive drag-and-drop interface
- Integrated dip picking
- Flexible and comprehensive model-building tools
- Efficient and fast creation of forward models
- Practical workflow to refine the model

A significant and increasing proportion of wells are drilled horizontally, or at a high angle, through reservoir sections. The benefit of this approach is increased reservoir exposure and, consequently, greater production compared to vertical wells. Among the challenges related to horizontal wells is formation evaluation using logs that may be responding to multiple reservoir layers.

Often, field petrophysical models are based on data acquired in the few vertical wells available in the reservoir, as it is challenging to use the data acquired in high-angle and horizontal (HAHz) wells directly. The 3D Petrophysics module for the Techlog* wellbore software platform enables the petrophysicist to understand and correct most common geometric effects that complicate measurement responses in HAHz wells, ensuring the information is fully used.



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A new approach

The graphical capabilities in the Techlog platform enable a new workflow for valid interpretations in HAHz wells. The measurements acquired in the HAHz well are used to define the formation geometry around the well and populate the layer properties. External sources of geometrical models or remote bed boundary inversion maps may be used to enhance understanding of the formation geometry around the well. The overall goal of the interpretation is to determine the position and properties of each layer that is traversed by the well.

Intuitive workflow for HAHz well interpretation

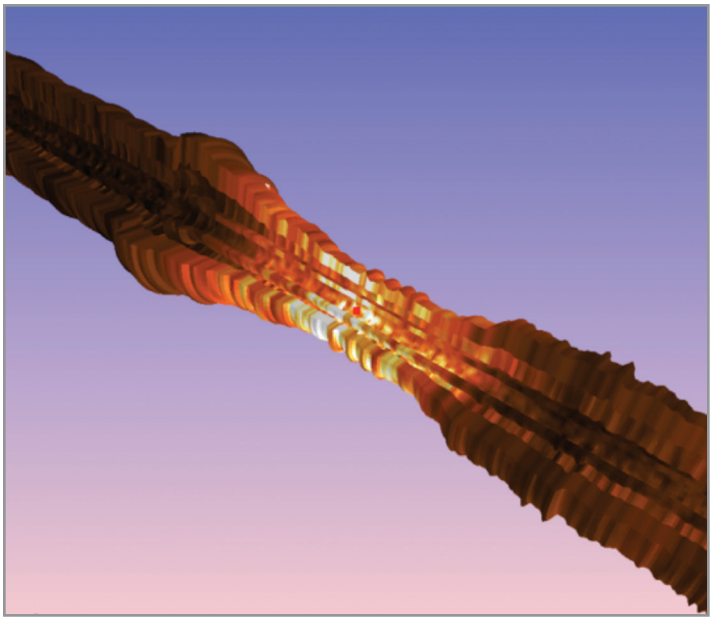
Logs recorded in the HAHz well are used to identify locations where the well path intersects formation boundaries. If available, image logs are used to calculate the dip at each of the boundary crossings. The structural model is then constructed using the boundary locations and dips.

If needed, boundaries located beneath the wellbore (i.e., uncrossed boundaries) are also added to the model. The spatial positions of these boundaries are estimated from offset well logs. Layers in the structural model are populated with log property values (gamma ray, vertical resistivity, horizontal resistivity, etc.). Measured logs are used to provide initial estimates of property values for layers that are intersected by the wellbore. Initial property values are manually entered for layers not crossed by the wellbore.

When the same layer is crossed multiple times, variations in properties may be observed along the well path. When this occurs, lateral property boundaries are inserted into the model. Forward model (FM) logs are then computed—these are a function of the structural model and layer properties, and are compared to the measured logs.

Details of the structural model and layer properties are adjusted by the user until there is good agreement between the measured and FM logs. The layer properties determined from this workflow are then used for petrophysical evaluation, rather than the measured logs.

As the formation properties determined by the workflow are free of the most common geometric effects in HAHz wells, they can be used in the same petrophysical calculations and workflows applied to vertical wells in the field or reservoir.



The Wellbore Centric Grid display.

The 3D Petrophysics module also includes a new feature: the Wellbore Centric Grid display. This enhanced display supports visualization of complex azimuthal and radial information around the wellbore trajectory. Boosting understanding and analysis, the Wellbore Centric Grid display provides a platform for azimuthal petrophysics.

Interpretations you can trust

Geometrical effects are observed on log responses in almost all HAHz wells. Previously, the industry was lacking a readily available interpretation methodology to tackle this very common phenomenon. This new Techlog workflow addresses the most common geometry effects observed in HAHz well logs. Now, petrophysicists can efficiently extract the full value from acquired measurements to make interpretations they can trust.

E-mail sisinfo@slb.com or contact your local Schlumberger representative to learn more.

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