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Structural Complexity Mapped at Well Scale

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SUMMARY

This paper aims to describe the work on a well in the Campos Basin, Brazil, where using tools like azimuthal deep resistivity and resistive image was possible to identify structural features at time to correct the model, maximizing the range of geological reservoir crossed by the horizontal well.
Abstract

The successful placement of horizontal wells is closely related to accuracy and resolution of the geological model. The drilling of pilot wells is necessary to fit the geological model and reduction of uncertainties. Despite this, such as lateral variations pinchout layers and sub-seismic faults normally imply the need for modification of trajectory for a correct positioning on reservoir.

This paper aims to describe the work on a well in the Campos Basin, Brazil, where using tools like azimuthal deep resistivity and resistive image was possible to identify structural features at time to correct the model, maximizing the range of geological reservoir crossed by the horizontal well.

In the design of a horizontal well in Campo Basin – Albacora Field, considering only the seismic data and the data obtained in pilot well, it was expected a well of simple geometry, without significant structural elements.

While drilling the horizontal section, was observed the presence of several unexpected structural features, such as sub-seismic faults and layer tilting, which caused a review on well trajectory. Decisions to change the trajectory of the well have been based on distances to limits calculated by the inversion layers in real time based on readings made by azimuthal resistivity curves and resistive image, associated with other curves such as GR, resistivity, density and neutron logs, in addition to calculating the dips observed on resistive images in real time, as well as discussions between the team of the reservoir, geological monitoring / geosteering, and directional drilling.

At the end of drilling, with the processed image data, it is possible to observe these structures in detail, and create a schematic geological section of the perforated section, which exemplifies the complexity found in the development of many fields.