

Advanced Image Interpretation of geoVISION Service Improves Formation Characterization, Offshore Libya

High-resolution borehole measurements enable precise identification of the formation tops and ideal perforation zones for development wells

CHALLENGE

Obtain subsurface images in offshore Libya field as part of an ongoing field development plan (FDP) in which multiple development wells are planned, but where offset data are limited.

SOLUTION

Deploy geoVISION* imaging-while-drilling service with ELANPlus* advanced multimineral log analysis and the sonicVISION* sonic-while-drilling service to provide detailed geological borehole analysis; analyze subsurface data using the Techlog* wellbore software platform for core-like interpretation.

RESULTS

Identified carbonate facies, vuggy distributions, bed boundaries, lateral positions, and in situ stresses for better-informed perforation, fracturing, and stimulation program design.



Evaluate formation ahead of development well drilling

Offshore Libya, an operator sought to enhance future gas production when drilling 13 development wells during Phase II of its FDP. A lack of image data and core analysis meant that the field's subsurface geology was unclear prior to campaign commencement.

For optimal results within the FDP, the operator decided to acquire image logs—subsurface images would enable better understanding of the heterogenous carbonate formation. With improved visibility, the drilling team could accurately determine formation tops, measure the maximum and minimum in situ horizontal stresses, and identify vuggy intervals for the best perforation zones in development wells. Such data were critical as the operator planned a vertical well completion design.

Obtain high-resolution subsurface images for better visualization

The geoVISION service plays a critical role in illuminating subsurface geology, clarifying structural uncertainties, and avoiding misinterpretation by providing high-resolution images with a nearly core-like level of detail. The service enables interpretation in memory mode or real time without interrupting drilling operations, saving valuable rig time.

In this application, the geoVISION service was deployed with ELANPlus analysis, the sonicVISION service, and true stratigraphic thickness points to enable comprehensive structural and sedimentological reservoir performance analysis. The advanced interpretation of images provided through the geoVISION service was performed using the Techlog platform.

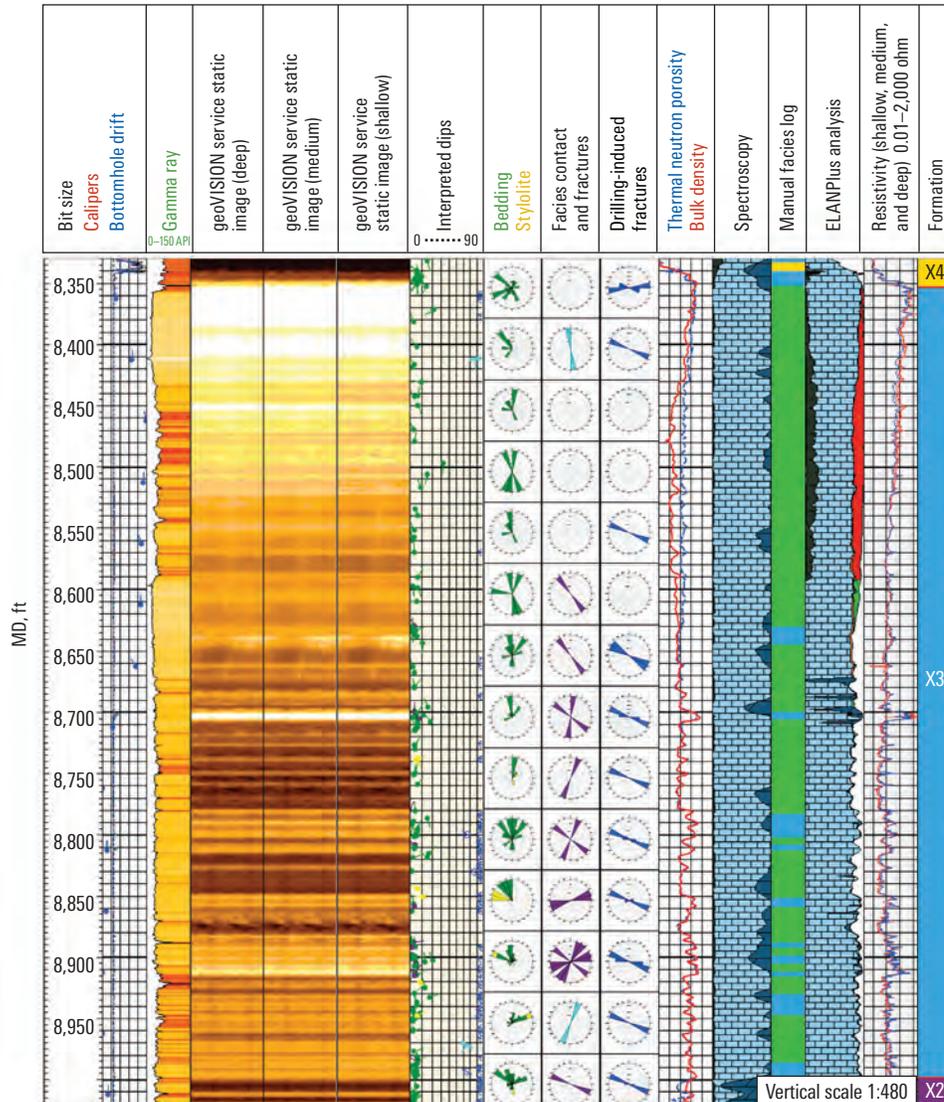
Identify critical reservoir characteristics to improve planning

Schlumberger experts used the geoVISION service and Techlog platform to interpret the subsurface geological images to provide a better understanding of carbonate facies and vuggy distributions, even in a formation with resistivity exceeding 2,000 ohm. The interpretation also provided a detailed knowledge of the basin's geology for better drilling decisions throughout the FDP. With reduced uncertainty around the characteristics of the formation, the operator was able to design well completions that would mitigate undesired water breakthrough in highly vuggy carbonate formations and identify the best perforation zones.

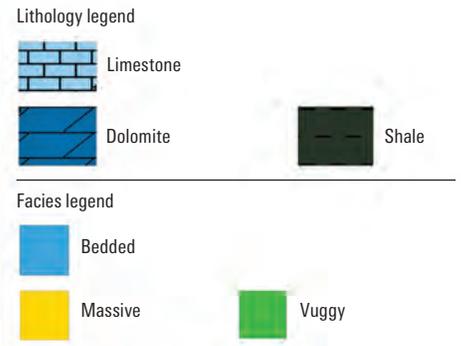
The enhanced images from the geoVISION service enabled the operator to confidently identify vugs, fractures, and bed boundaries. With this structural and stress analysis was performed to identify fracture direction for use in the drilling of planned horizontal wells.

Looking ahead, the operator used the improved correlation certainty, confirmed lateral positions within the reservoir, and a better understanding of reservoir properties to design a stimulation program for optimal future development wells in the area.

CASE STUDY: Advanced interpretation of geoVISION service images improves formation characterization, offshore Libya



A log obtained using the geoVISION service shows the facies encountered within the X3 formation within the targeted section. The zone was revealed to be mainly vuggy limestone and dolomitic limestone facies with bedded limestone and dolomitic limestone facies within the lower and middle parts of the logged formation. The bedding features are scattered in directions and generally trending northeast and northwest with some minor trends southeast and southwest within the formation. The micro vugs are decreasing upward—in both size and the connectivity between vugs—within the formation and appear to be open and filled by conductive mud. Statistical analysis of manual facies over the upper logged section within the X3 formation showed that, of the main facies observed within the logged formation, 65% were vuggy limestone and dolomitic limestone facies (the remaining 35% were bedded carbonates).



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