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Reducing structure uncertainties in challenging complex reservoirs using geophysical automatic stochastic inversion technology for multilayer reservoir mapping during horizontal well placement.

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As operators are keen on optimizing production rates in the most efficient and cost-effective manner and the changes of the recent years on the oil market motivated the collaboration between operators and service companies to find cost viable solutions to optimize production. This involved an increase of horizontal wells drilling, to guarantee the success of drilling horizontal wells, new technologies must be used to reduce structural uncertainty and achieve high net- to-gross in the horizontal section for superior production.

Petrobel (Eni) decided to place a horizontal well in Gulf of Suez, Where a complex structural system with highly uncertainty takes place. The main source of structural uncertainty resides in the poor quality of seismic data from which reservoir models are created. In addition to the uncertainty in the fault/horizon positions due to the poor resolution of seismic images, structural interpretations or migration results themselves are not unique and often rely on the subjective decision of an expert. Placing of horizontal wells presented significant challenge, as the objective was to maximize reservoir exposure, taking into account high structural uncertainity with lateral variation in formation dips. Based on the well plan path, pre-job modelling with a resistivity inversion indicated a lot of geosteering difficulties and challenges

As a fit for purpose solution to address these challenges a new automatic stochastic inversion technology was selected to be able to map multiple bed boundaries in high resolution, in order to illuminate the reservoir structure in real time ahead of the bit. Which would significantly improve geosteering decisions to remain within the oil-bearing sand.

While drilling the well, unexpected geological features were encountered, However the new mapping technology while drilling service could provide the team with the necessary information to geosteer into the target, and expose the well to around 100 meters of clean sand. Inside the reservoir. The new stochastic inversion technology was able to detect Thin layers about 0.5m in thickness, were observed about 1.5m TVD below the well trajectory, in addition to mapping the Water contact which was confirmed to be at TVD 2398m. eliminating the need for a pilot hole and improving financial sustainability, in addition updating the model for this area with the water contact exact depth will play a crucial role in future wells planning.