

## **Geo-Stopping, the Real Value of At-Bit Measurements in Deep Water Angola**

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Operating in a high cost, deepwater environment the financial benefits of acquiring an array of real time data is often easy to quantify. However it is not always as easy to strike the correct balance between quick decision making, engineering integrity and subsurface success, with the geological objectives often being the ones compromised. This presentation will outline how in the drilling of the Greater Plutonio Development all these demands have been managed using at bit LWD resistivity measurements.

The reactive nature, once exposed, of the shales overlying the deep water turbidite sandstone reservoirs means that it is essential to leave as little as possible exposed when setting the casing above. The individual reservoirs targeted are also often limited in vertical extent with a high proportion of the net in the upper portion meaning that there is a strong geological need to minimize the penetration into the sand bodies. With the depth uncertainties in the seismic dataset stopping drilling the overburden section on depth is not practical as it would likely lead to excessive penetration into the reservoir or a long length of the mudstone exposed above so a different approach is needed.

With the use of at bit resistivity measurements the field has been able to be developed with overburden drilling stopped on the basis of geology actually observed - 'geo-stopping'.

This approach has preserved in excess of 100m of the best quality reservoir for production and injection and in a number of wells prevented entire reservoirs being exposed to damaging cementing operations. At the same time it has been possible to cut an average of 24 hours from the online rig activities from any of the alternative methods that may have previously been attempted in order to get close to this reservoir saving.