Wide Azimuth Seismic Acquisition (WATS) Vastly Improves Subsalt Resolution in the Deepwater GOM: Case Studies in Atwater Valley, Mississippi Canyon and Green Canyon Areas

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Wide Azimuth Towed Streamer (WATS) technology has created a revolution in BP's Gulf of Mexico development projects. Multi-azimuth surveys over development areas like Mad Dog, Tubular Bells, Puma and Atlantis, has helped solidify the benefits gained, both technically and financially. Better subsurface images have led to a better understanding of the subsurface, better drilling performance, better field development, and ultimately better use of investment dollars.

The idea of using multiple azimuth surveys to improve imaging is not a new concept. Shell's 1988 experiment over Bullwinkle in the Gulf of Mexico showed the benefits of multiple shooting directions. BP's Thunderhorse Field is covered by numerous 3D surveys shot in different azimuths and also has reaped the benefits of improved imaging from multi-azimuth surveys. Although a great technology for development/production assets, a more cost effective version of WATS was needed for exploration. Spurred by BP's success with WATS, the geophysical industry began to offer multi-client seismic surveys, much larger in areal extent at the expense of being more coarsely spatially sampled, but sampled well enough for exploration purposes. These exploration WATS (XWATS) surveys started in late 2006 and now cover a large portion of the deep water central and eastern Gulf of Mexico. Improvements in subsurface image quality over older narrow azimuth acquisition have been readily demonstrated and have led to exploration success.

Although the initial uplift has been promising, early work with WATS and XWATS surveys has shown that an additional level of uplift can be achieved through detailed reprocessing of the data. Better imaging algorithms and improved anisotropic velocity models are leading to better images of the subsurface. Even though WATS acquisition is not the answer to every imaging problem, successful application has led to exploration success in areas that were previously difficult, if not impossible to image in the deepwater GOM.