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Multi-azimuth Streamer Seismic in the Nile Delta

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SUMMARY

Since 2003 BP has been acquiring Multi-Azimuth (MAZ) Streamer Seismic in the Nile Delta. Other these last 5 years the total unfold MAZ data covers 25,000 sqkm, over a total surface area of about 6000 sqkm. The initial results showed that MAZ data greatly improves general image quality, signal-to-noise ratio and lateral resolution, as well as suppresses diffracted multiples effectively. Since those early results MAZ data has been taken to more difficult areas.
This paper will give a short historical overview on MAZ in the Nile Delta and will focus on some of the new technologies that have been applied to get more value out of the MAZ data.

Summary

BP has been acquiring Multi-Azimuth (MAZ) Streamer Seismic in the Nile Delta since 2003. Over these last 5 years 25,000 sqkm of 3D marine seismic has been acquired for MAZ data, covering a sub-surface area of about 6000 sqkm. The initial results showed that MAZ data greatly improves general image quality, signal-to-noise ratio and lateral resolution, and suppresses diffracted multiples effectively. Since the early results MAZ data has been taken to more difficult areas.
This paper will give a short historical overview on MAZ in the Nile Delta and will then focus on some of the new technologies that have been applied to get more value out of the MAZ data.

The Nile Delta

The Nile Delta can be characterized, in terms of seismic velocities, by a structurally complex dipping waterbottom, shallow gas charged channel systems in a compaction driven overburden, overlaying a complex anhydrite rich layer (Messinian). Prospectivity can be found both in the post- and pre-Messinian section.
Apart from the lateral velocity changes described above, the waterbottom and near-waterbottom complexities give rise to complex diffracted multiples, which have a negative impact on the seismic data quality both in the shallow (waterbottom multiples) and in the deep (Messinian peg-legs).

Multi-azimuth Streamer Seismic

Wide- or multi-azimuth seismic data has the potential to illuminate structures from different directions and suppress diffracted multiples due to their random appearance after stack as a function of acquisition azimuth.
Because of the deep water nature of a large part of the Nile Delta, the use of marine streamer acquisition (opposite to a wide-azimuth OBC acquisition) is the preferred option to acquire data. Multi-azimuth data is then acquired by sailing over the same area in different directions.

Results

Because of imperfections in current processing technology, processing of MAZ data is not straightforward and will leave errors in the final imaged results, both kinematic (positional) and dynamic (amplitude).
However, the early results show that MAZ data can be successfully combined through a basic processing flow. 3-D (diffracted) multiples are successfully suppressed and velocity issues can be dealt with post-imaging. Examples on our MAZ field data will illustrate these points.

The next wave of MAZ

With the success of the early MAZ acquisitions, the method is pushed into more difficult areas. There also the method delivers, though some of the additional challenges need to be addressed by extending the initial conventional processing sequence. In the paper some of these more recent examples will be presented.