

EX02

The Impact of High Channel Counts, Very High Data Rates and Very Low Frequencies

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SUMMARY

There has always been continuous geophysical technological advances on multiple fronts, both on equipment (e.g. computing), the way of working (e.g. night operations), and processing algorithms. In PDO's experience the major catalysts for change are twofold – collaboration with vendors, and motivated geophysicists. These have allowed us to experiment with different techniques without fear of failure.

The aggregate of these developments now enables dramatically increased channel counts, which in turn are funded by a step-change in productivity, for the requisite capex.

The ultimate result has been the potential for acquisition of properly sampled data in both source and receiver domains. Wide azimuth acquisition with adequate in-line and cross-line offsets, together with previously unthinkable fold are providing a new era of imaging. Further, coverage over very large areas with fast turn-around is nowadays a reality.

Introduction

The era of easy hydrocarbon access in both Exploration and Production is approaching its end. As fields mature and exploration prospects become more difficult to map, different approaches and geological models are developed to uncover future opportunities and to maximize the extraction of the already discovered hydrocarbon resources.

Geophysics can and should be one of the key enablers in these basins. And in a low oil price environment, quality improvements without a corresponding increase in time and cost will always be welcome.

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In some cases our assumptions have been either too simple or we have overlooked some of the less obvious sources of adversities. It is not only the geophysical challenges that have changed over time but also the end user of geophysical solutions, and their increased expectations.

This challenge must encapsulate the raising of data quality and the provision of adequate seismic areal coverage, whilst keeping unit acquisition costs low and ensuring no harm to people or the environment.

The developments have been in three domains; technology, source, and acquisition systems. Recent progress in acquisition technologies, like simultaneous recording (Bouska, 2009), have massively escalated productivity. The success of low frequency sweeps has encouraged the vibrator manufacturers to focus on the fidelity and output of existing and new vibrator shaker designs, while acquisition systems manufacturers are managing to continue to drive down the per-channel cost.

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This presentation will both review the innovations that have been applied in recent projects, and also look to the future and will highlight innovations that may lead to further improvements in sampling and therefore quality, whilst again reducing costs.

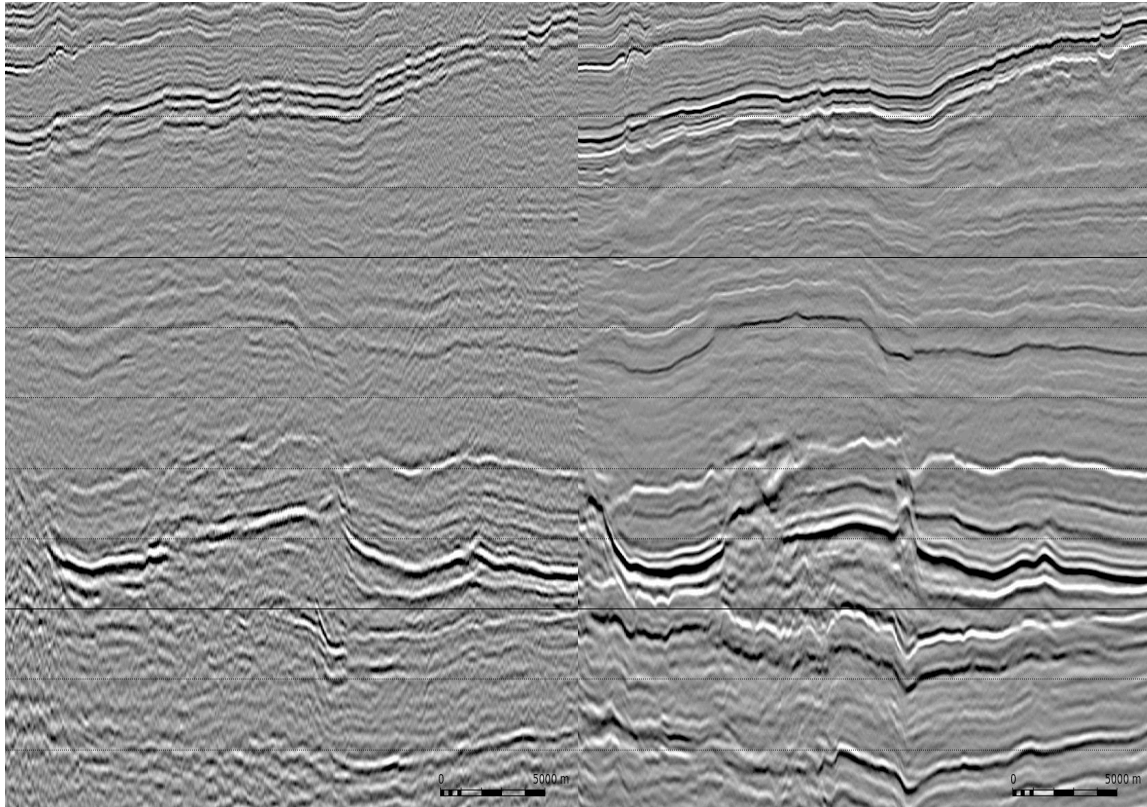


Figure 1 Comparing a 2001 Acquisition Narrow Azimuth Dataset (left) with a 2014 Wide Azimuth Broadband Dataset (right).

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References

Bouska, J. [2009], Distance separated simultaneous sweeping: Efficient 3D vibroseis acquisition in Oman. BP. 79th SEG International Exposition and Annual Meeting.