

Significant Potential of World-Class 3D OBC Seismic Surveys, Offshore Abu Dhabi

Hiroshi Hagiwara[1]; Keiichi Furuya[1]; Hidemasa Ikawa[1]

[1] JODCO

<http://www.jodco.co.jp>

This talk presents the historical challenges to carry out world-class 3D OBC seismic surveys over super-giant producing oil fields in offshore Abu Dhabi, and extends our views on future potential of these surveys.

We initiate this talk by introducing the reason why we need 3D seismic survey over the matured producing oil fields. We also highlight some potential risks that may face in acquiring 3D seismic surveys over active producing fields in the shallow water area in the Arabian Gulf.

We then introduce a case history of a world-class 3D OBC seismic survey (1500 sq.km full fold) from a super-giant offshore producing oil field in Abu Dhabi, which was successfully carried out by an integrated multi-disciplinary team from three different companies over an 18 month period from 2000 to 2001. This highlights a wide range of challenges and achievements through the following steps:

1) Acquisition: We introduce some of the planning, operational, QC & HSE aspects and the main challenges faced in acquiring such a high-spec orthogonal OBC survey (in excess of 300 folds) over a very active field which is extremely populated with infrastructure and partially located over very shallow water.

2) Processing: We describe some typical problems of the offshore data quality and present the significant challenges in data quality improvement, including hydrophone-geophone summation, linear noise attenuation and multiples removal.

3) Interpretation & seismic reservoir characterization studies: We explain field-specific interpretation challenges and introduce our solutions for each subject. Highlighted are some specific solutions for the analysis, such as map migration for the depth conversion (generating the reliable depth structure maps resolving anomalies generated from overburden) and a neural network approach for the reservoir property distribution analysis. These products were incorporated into the reservoir modeling for the appropriate field development and proper well planning.

We conclude the talk by describing our current method to maximize the full potential of the world-class 3D seismic survey. This includes overviews of 3D seismic anisotropy analysis, utilizing/incorporating azimuthal VSP data and a 4D seismic feasibility study including rock physics and seismic modeling. We also preview a new world-class 3D-4C OBC survey (730 sq.km full fold) which has just been acquired from other super-giant oil field over an 8-month period from 2005 to 2006. The 3D-2C production processing is currently in progress in parallel to the test processing on 2D-4C lines in order to investigate the potential value of the converted wave data.

The 3D seismic survey has become an increasingly important aspect in developing oil fields in the Arabian Gulf since 1990s and the OBC survey methodology is a major factor in this expansion now and in the future.