

Agbami 3-D/4-D Survey Design- Understanding Drivers, Geophysical Requirements, & 4-D Optimization

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The Agbami Field (Unit), operated by Star Deep Water Petroleum Limited (Chevron), is located in OML 127 and OML 128, 70 miles offshore Nigeria in approximately 4800 feet of water. Since the time of two previous seismic surveys much has been learned both about the subsurface properties of the Agbami field and how new seismic acquisition technologies can be used to detect and image these properties.

To plan a new survey, an analysis of the existing seismic data was performed to understand the needed improvement to meet our subsurface goals and what technologies would allow for that improvement. Ocean Bottom Nodes were selected for the ability to work in and around facilities, acquire 4 component data, achieve the repeatability requirement for 4D techniques, and to design full azimuth surveys to assist in multiple suppression and illumination.

We then used a combination of ray tracing, finite difference modeling, fold and bin analysis, and time-motion studies to identify the geophysical and operational parameters that would impact the survey design:

Near offset sampling requirements for imaging

Far offset sampling for AVO

Azimuthal distribution of offsets for multiple suppression

Source and receiver sampling for aliasing mitigation and 4D repeatability

Source and receiver coverage to optimize the migration aperture

Balancing the efforts of the source and receiver handling vessels

The final design produced was an optimization of meeting the geophysical constraints of the program with the operational goals of efficiency, cost management and long term 4D sustainability.

Best Practices

Model synthetic data in order to optimize acquisition parameters.

Use survey design software (Mesa) to evaluate alternative survey geometries.

Work with technology partner Chevron ETC.

Leverage contractor capabilities to gain insight into OBN acquisition and processing (Seabird, CGGV).

Learn from other companies who have used OBN technology (BP-Atlantis, Total-Girrasol/Dalia, Shell-Deimos).