

The role of acquisition and processing in the suppression of seismic multiples for the improvement seismic image (A case study from Southern Sindh Monocline, Pakistan)

Shabeer Ahmed Abbasi¹; Anwar Ali² and Sarfraz Hussain Solangi³

¹Oil and Gas Development Company Limited, Islamabad

²Kuwait Foreign Petroleum Exploration Company, Kuwait.

*³Centre for Pure and Applied Geology, University of Sindh, Jamshoro, Pakistan.
shabeer.ahmed@ogdcl.com*

Abstract

Seismic energy that bounces more than once is known as multiples while virtually all seismic energy involves some multiples. Multiple reflection problems not only exist in marine seismic data but also in land seismic data. Multiple suppression is an important data processing step for both marine and land seismic data. Techniques for the suppression of those multiples have improved rapidly in past years, but still it is a very challenging job.

This research is a case study of seismic data acquisition & processing of data from Southern Sindh Monocline, Pakistan to focus the role of seismic data acquisition and processing for the suppression of multiples and to enhance the signal to noise ratio during acquisition and processing. The main objective was to get the best results from 2D seismic data balancing with the budget and other constraints of the project and keeping in view the densely populated area. The acquisition parameters were selected on the basis of previous seismic data acquired in the area and that selection can result a dramatic changes in the outputs in enhancing of the S/N ratio. There were major challenges in the area for the acquisition of seismic data as it lies near the marshy land of Arabian Sea coastal zone, energy penetration due to thick subsurface shallow volcanic layer, intrusion body above the reservoir level and thick populated area. Energy source was tested with different depth and charge size in order to avoid weathering layer effect and to resolve the reservoir level signatures by reducing source generated noise and saving maximum frequency content. While the selection of optimum seismic data processing parameters was also important step to enhance the reservoir level of the seismic data, to resolve static correction and to resolve low resolution imaging below the intrusion body.

After comprehensive tests, data analysis and processing methods, best reasonable processing sequence and parameters were optimized combined with multi-year technique, research, experience and careful work under strict quality control.

Based on comprehensive data analysis, the research objectives were developed as: (1) Unite and take advantages of raw data information and tried best to solve static problem by establishing a reasonable processing flow, (2) Used multi-fields and interactive methods for the improvement of the S/N Ratio, (3) Good jobs of conventional pre-stack gather processing balance energy and improve the resolution scientifically, (4) Choose reasonable deconvolution methods and parameters for the improvement of wavelet consistency and the resolution, and (5) Finally Set up of a reasonable geological model and velocity field; carried out pre-stack time migration to get better imaging. Improvement in the seismic data can be clearly seen in which two lines are shown for comparison having same processing sequence, before and after processing.