Application of Adaptive De-Ghosting on the Conventionally Acquired Seismic Data Improves Inversion Results

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ABSTRACT

Various acquisition and processing approaches have been introduced to compensate for the notches created by source and receiver ghost reflections in never ending quest to increase useful frequency range. However, what we could possibly do to fill in the ghost notches for the vast libraries of conventionally acquired seismic datasets? WesternGeco has developed a processing solution to address the ghost notch problem which can be applied to conventionally acquired, flat streamer geometries. Adaptive de-ghosting (AD) performs de-ghosting and re-datuming in a 2D sense. In this paper we are going to demonstrate the effectiveness of the above described method in extending the bandwidth on conventional streamer data The survey was acquired in 2012 offshore Sri Lanka with the conventional flat streamers. As basalt absorbs substantial amount of seismic energy, very little is left to penetrate it; hence the main push to broaden the spectra and extend the useful frequency range. In order to examine the effect of the enhanced low-frequency signal content on seismic data after the application of Adaptive De-ghosting, we pursued two paths. Firstly, we used a robust deterministic evaluation of the processing sequence parameters selection optimization; through the application of Well Driven Seismic (WDS™) technique. The statistical attributes results are indicating that the AD (Source and Receiver) process is achieving the best results. In the second approach, we have used Post-stack seismic Acoustic Impedance inversion technique, in order to show added value of enhancing the low frequencies in the seismic data after the application of Adaptive De-ghosting process. Due to the lack of the low frequency component below 10 Hz in the input seismic data before the AD processing, its inversion results are shown to have a missing imaging details and looks quite similar to the model results. On the other hand it is evident that the inversion results of seismic data after the AD processing is providing a superior seismic inversion results that capturing more acoustic details that do not exist in the input seismic data. Thus, it can be concluded that there is a full agreement between the deterministic extracted wavelets statistical attribute analysis and the inversion results where both are indicating that the AD (Source and Receiver) is achieving the best results with respect to the match with the borehole acoustic data. This adds measure of confidence on the obtained results.