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Cost-effective Seismic Data Reprocessing for Sub-salt Imaging Enhancement.

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Summary

Fit-for-purpose seismic reprocessing workflow comprises improving the seismic bandwidth by spectral whitening and frequency shaping with longer gate amplitude scaling to recover the strong amplitude dimming laterally and vertically especially in the pre-salt seismic levels have been applied to the final migrated seismic volume of the legacy seismic data. To devise a cost-effective seismic data post-stack seismic processing for producing high-quality images in this complex geology subsalt basin.

The deep offshore is a challenge to seismic processing and imaging techniques, due to the complexity of the salt body structures and the omnipresence of mode conversions that mask the primary signal. Cost efficiency in the global recession because of the low oil price long standing issue could be motivated to look for another simple usable alternatives to the highly sophisticated techniques have been widely utilized in subsalt deep water imaging. Indeed Wide azimuth towed streamer WATS and even full azimuth single vessel coil shooting with high offset coverage and broad band seismic with extremely very low frequency less reaches 2.5 Hz was enables seismic energy penetrating the ultra-deep subsalt and brought a significant change in subsalt deep offshore imaging accordingly. The conventional offshore seismic data acquisition method known as Narrow-Azimuth Towed Streamer (NATS) and data collected this way, from just one direction (or azimuth), do not yield reliable images of the subsurface is not suited any longer for such a complex geology. Broadband seismic data has brought a new level of understanding to the mapping of these facies. Using the full spectrum of frequencies (from 2.5 Hz to 125 Hz). Pre stack depth imaging with advanced techniques such as the expensive and intensive computer CPU time such as RTM and FWI are proven technologies for high resolution velocity model with proper depth imaging techniques. They are the commonplace depth imaging techniques nowadays for complex subsalt geology seismic data type. However in this case studies to complying with cost optimization trend, another revisit of the subsalt legacy seismic survey deep offshore Angola was made to revoke if the seismic data quality could be improved and the residual seismic data concerns of those legacy seismic data sets could be overcommit.

Fit-for-purpose seismic reprocessing workflow comprises improving the seismic bandwidth by spectral whitening and frequency shaping with longer gate amplitude scaling to recover the sever amplitude dimming laterally and vertically especially in the pre-salt seismic levels have been applied on the final migrated seismic volume of the legacy seismic data. To devise a cost effective seismic data post-stack seismic processing for producing high quality images in this complex geology subsalt basing , a set of seismic diagnostic QCing tools have been extracted looking at the data in vertical/horizontal seismic sections with extracting seismic attributes either coherency seismic attributes that strongly reveal the significant improvement in seismic data quality Instantaneous phase seismic attributes that depicted clearly the ideally continuous layering for thin layers incorporated with salt and subsalt layering and the post stack reprocessing workflow has suppressed the over migration smiles artefcats in the hollow structure within the salt bodies and underneath it as well moreover the remaining random noise was drastically knocked down as is detonated in the signal/noise spectral analysis. (Figure 1). Volatility in oil markets has driven the upstream oil and gas industry to focus on reducing capital spend and operating costs and it shouldn’t be prohibitive to find a way to help to utilizing the existing legacy seismic data and another review even with implementing such a reasonable simple processing workflow could be a turning point in seismic data quality enhancement. Utilization of the existing information and local capacities could help in reducing cost could pave the way to reinterpret the challenging seismic data after some sort of seismic data refinement that is clearly showcased in this study.

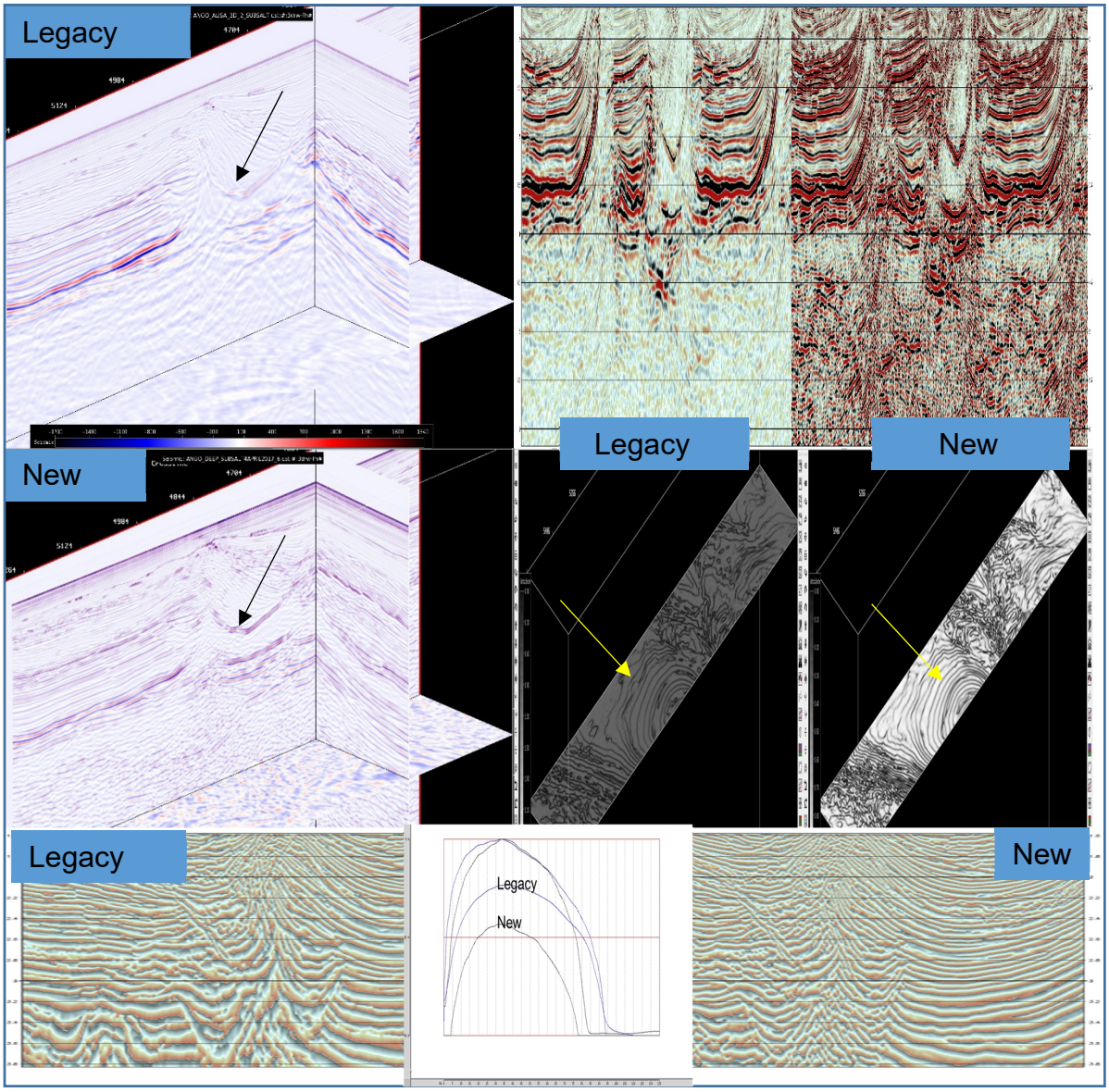

Figure 1 *Composite view shows the improvement in seismic data quality of the new proposed seismic processing workflow in comparison of the legacy seismic data quality.*