

I have a Footprint on my Seismic Data, now what ? New Workflows for Improving Post-Stack Seismic Data

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Acquisition footprint often poses a major problem in 3D seismic data. Some of the causes for footprint are constraints on survey design, backscattered noise, lateral variations of fold, offset, and azimuth distributions, and spatial aliasing. Faced with extracting subtle features contained in seismic amplitudes, interpreters are often confronted with footprint that can mask important details critical to the identification of key reservoir architectural elements. Ideally, footprint from acquisition is handled in the processing shop through more careful attention to trace balancing statics, noise reduction and velocity analysis. Such reprocessing is not feasible on many legacy data volumes where the pre-stack data cannot be found or no longer exists. Seismic attributes provide an effective means of delineating subtle geological features of interest such as channels, small faults, and fractures. Footprint can mask geologic lineaments such as faults and fractures that would otherwise be enhanced by attributes like coherence or curvature. For this reason attributes can be used to both design and evaluate the effectiveness of alternative footprint suppression workflows. In this work we review, apply and evaluate the three most popular footprint suppression workflows: structure-oriented filtering, kx-ky filtering, and limited data reconstruction using singular value decomposition. Application to legacy land data from U.S. mid –continent shows that evaluation of attribute images computed from filtered volumes provides a quantitative means of determining which workflow, or cascaded workflow, works best for a specific data volume.