

Comparison of 3D Interpolation Methods and Validation through Post Stack Inversion: A Case Study from 3D North Amer Oil Field, Gulf of Suez, Egypt

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Abstract

We compared a 3D sparse time-domain Radon interpolator (3D-TDRI) with 3D frequency-domain matching pursuit Fourier interpolation (3D-MPFI) using marine seismic data. 3D-MPFI and the similar anti-leakage Fourier transform are widely used beyond aliasing interpolators. 3D-TDRI is not widely used, possibly because of its computational cost. We illustrate with a marine seismic data that 3D-TDRI can provide a sparser representation than MPFI in the transform domain. From compressive sampling theory, we know that this may provide better reconstruction of undersampled data. 3D-TDRI and 3D-MPFI were applied to complex and highly aliased marine data. The results of 3D-TDRI were significantly better than the results of 3D-MPFI. In particular, steeply dipping events were better reconstructed, continuity of events was improved, and artifacts were reduced. Moreover, the results were validated deterministically through Well-Driven Seismic (WDS) and post-stack Acoustic Impedance techniques.