

## Pitfalls in Prestack Inversion of Merged Seismic Surveys

Sumit Verma<sup>1</sup>, Shiguang Guo<sup>1</sup>, Thang Ha<sup>1</sup>, and Kurt Marfurt<sup>1</sup>

<sup>1</sup>University of Oklahoma

### Abstract

Recently the Mississippi Lime has become one of the most active resource plays. Our study area falls in-between the Fort Worth and Midland Basins. The main production comes from high porosity tripolitic chert. Our objective is to use 3D seismic data to map the areal distribution of discontinuous tripolitic facies.

In the early 1990s several 3D surveys were shot in the study area to image shallower objectives. With the advent of the Mississippi Lime play, four of these surveys were merged and reprocessed using careful statics and velocity analysis. Even after prestack time migration, the target zone is contaminated with acquisition footprint. The data are low (~15) fold and contaminated by highly aliased, high frequency, high amplitude ground roll. Given the sparsity of the survey, modern  $f-kx-ky$  filters were not able to remove ground roll prompting the development of a new ground roll suppression workflow. In workflow we first window and low-pass filter ( $f < 50$  Hz) the data, 3D patch by 3D patch. We then apply linear move out to approximately flatten the ground roll phases, estimate the dip about this reference move out, and compute coherence within a 3-channel by 3-shot by 20 ms window about each sample. Using a Kuwahara algorithm, we choose the most coherent window within which we apply a structure-oriented KL filter. At the end we simply the modeled ground roll from the original data. This 3D filter preserves signal amplitude and is flexible enough to model the piece wise continuous ground roll pattern common with irregular topography.