Improved Subsurface Imaging through Reverse Time Migration: A Synthetic Case Study

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Abstract

Conventional seismic imaging fundamentally consists of computation of two-way travel time and extrapolation of the observed wave field in depth using a suitable algorithm. It is generally referred to as one-way migration solution because of mathematical simplifications in the implementation of the wave equation. In complex geological situations like salt flanks and other structures one-way migration solution does not significantly handles severe combinations of structural dip with high-velocity contrast. Reverse Time Migration is a two-way, finite difference migration solution to the wave equation that improves more accurately the quality of the subsurface images by describing wave propagation in complex media. It solves the wave equation forward in time for the source modeling field and backward in time for the recorded receiver field for that shot. At each time step, the depth image is obtained by cross-correlating the two fields. The present research work compares the results of the Kirchhoff Prestack Depth Migration (Kirchhoff PSDM) and Reverse Time Migration using 3D synthetic seismic data.