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Reverse time migration: A prospect of seismic imaging methodology

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Abstract

Reverse time migration (RTM) is a seismic imaging method to map the subsurface reflectivity using recorded seismic waveforms. The practice in exploration seismology has long established a two-fold approach of seismic imaging: Using velocity modeling building to establish the long-wavelength reference velocity models, and using seismic migration to map the short-wavelength reflectivity structures. Among various seismic migration methods for different situations, RTM is the only method that is capable to use all seismic wave types that can be computed numerically. Being initiated in early 1980's, RTM seeks an image of the subsurface reflectivity as the best match in an image space between the extrapolation of time-reversed waveform data and the prediction based on estimated velocity model and source parameters. Judging the image quality in the same space of forming the images is more advantageous than the approaches of modeling and inversion which seek the solution in the model space but judge its fitness in data space. Considering that most seismic migration applications today still use primary reflection as the only signal, the capability of RTM to use all computable wave types is unique and helpful reducing the imaging artifacts due to mistaking

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