DATA SHEET

Kirchhoff Pre-stack Time Migration

ION's amplitude-preserving Kirchhoff pre-stack time migration routine is ideal for imaging in relatively complex geologic conditions or for velocity fields, which do not require employing full pre-stack depth migration to meet the imaging goals. Our approach accounts for higher order terms in the travel-time versus offset and NMO expansion by explicit ray-tracing. This technique accurately models 1D ray bending in a medium up to angles of 150°. The result is no bias in the velocity estimate or the positioning of steep dips within the limits of time migration. Detailed understanding of the anisotropic velocity regime, and careful velocity model manipulation results in superior time imaging. Our continuous dense auto-pickers and QC tools deliver structurally consistent velocity and anisotropy fields, required to produce quality images. Attention to detail in building the anisotropic velocity model, in conjunction with appropriate selection of migration parameters, results in a superior PreSTM image, with visible fault-plane reflections, and preserved steep dips.

Key Features and Benefits

→ **Amplitude Preservation**

The PreSTM algorithm offers superior amplitude preservation by using correct amplitude weighting. Together with accurate handling of ray bending effects, the gathers serve as the ideal input for AVO analysis, especially in areas of complex geology.

→ **Operator Anti-aliasing**

Migration noise as a result if operator aliasing is mitigated effectively using a multi-frequency anti-alias operator that controls the frequency content as a function of dip. This way, steep dips are preserved while time migration noise is minimized.

→ **Turning Ray Imaging**

The program can image very deep or overturned seismic events, migrating events accurately up to 150°.

→ **Velocity Analysis**

Gathers for velocity analysis are produced during migration rather than after, taking into account the lateral movement of events at non-zero dips and accelerating the convergence to the final velocity field.

→ **Anisotropy**

Our solution can image from vertically transversely isotropic (VTI uniaxial anisotropy) velocity models. The medium is parameterized in the terms of Thomsen's parameters (i.e., epsilon and delta) and the vertical velocity, all of which may be spatially variant. The result is a higher-quality time image of the subsurface that better matches the time of geologic structures from wells.

→ **Topography**

Topography has a kinematic effect on the pre-stack seismic data, and unless it is properly accounted for, the velocity model and the resulting image-quality will be compromised. The program honors topography exactly in all its imaging stages.

→ **Bandwidth**

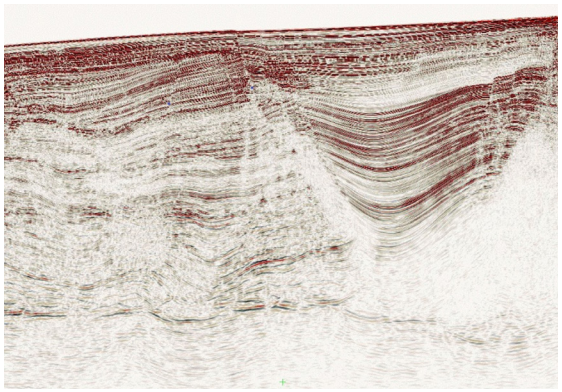
The bandwidth of the input data is preserved by accurately interpolating during imaging all necessary runtime parameters, such as the travel-time tables and the amplitude weighting coefficients. This produces better event coherency and lateral resolution than what is offered by other commercial pre-stack time migration software.

→ Efficiency

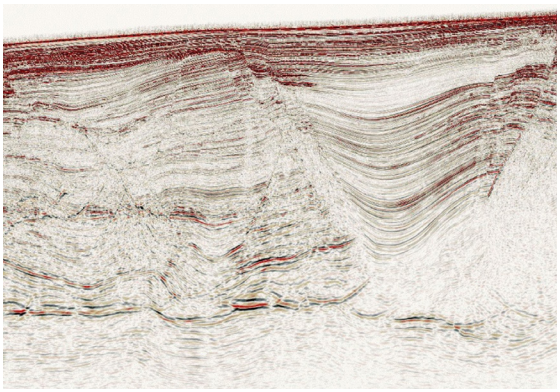
The high performance allows the use of “no compromise” migration parameters, resulting in the efficient production of high-quality PreSTM volumes.

→ Application

PreSTM is designed for 2D and 3D land and marine seismic data (streamer and marine). The algorithm is used when the complexity of velocity or geology does not require pre-stack depth migration to meet project imaging goals.



Legacy anisotropic 3D PreSTM result



ION anisotropic 3D PreSTM result

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