Application of Anisotropic 3D Reverse Time Migration to Complex North Sea Imaging

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Abstract/Excerpt

Following completion of model building, amplitude preserving 3D depth migration is usually performed using a Kirchhoff scheme for modest structural problems with steep dips. For structures where multi-valued ray-paths exist (e.g. complex salt bodies), we generally use a oneway Wavefield Extrapolation (WE) algorithm instead. However, more recently, full two-way solutions of the wave equation, such as Reverse Time Migration (RTM) have become commercially available:- these are suited for highly complex environments, where both steep dips and multi-pathing are an issue.

Standard shot-based one-way WE preSDM techniques image the subsurface by extrapolating the source and receiver wave-fields for each shot. The imaging condition is invoked by cross correlating these two wave-fields at each depth level, and then summing the contributions from all shots in the aperture to form the image. One of the assumptions made in using this technique is that the wave-fields travel along the direction of extrapolation only in one direction: downwards for the source wave-field, and upwards for the receiver or scattered wave-field.