Conclusions and Speculations

The exploration seismologist should look for two improvements after including DMO correction in the CMP processing of reflection seismograms.

1. The dip bandwidth (lateral resolution) in CMP stacks should be increased. Reflections from both horizontal and dipping reflectors should be enhanced by CMP stacking.

2. Velocity estimates derived via NMO correction should be more highly resolved, and the estimates should approximate RMS velocity as a function of migrated, two-way vertical time. After DMO correction, the RMS velocity estimated from a particular reflection should not depend on the dip of the corresponding reflector.

The simple implementation of DMO by Fourier transform, and its accuracy for large offsets and steep dips, make it an attractive algorithm for performing DMO correction. The most significant drawback of the algorithm is the required Fourier transform over the CMP axis, which precludes a simple modification of the algorithm for lateral velocity variations.

The usefulness of DMO by Fourier transform in regions of severe velocity variations has not been tested, but one can easily find regions for which the algorithm should fail miserably. An example might be an offshore region where the seafloor is steeply dipping. There, prestack migration may be the only worthwhile tool for estimating velocities and imaging reflectors beneath the seafloor. Generally, DMO correction should improve the accuracy of CMP processing; but in areas where CMP processing is entirely inappropriate, this improvement may be insignificant.

Perhaps the most important application of DMO correction lies in the CMP processing of three-dimensional seismic wavefields. The ability to accurately migrate data recorded in 3-D seismic surveys depends greatly on the ability to accurately estimate velocities. DMO correction of 3-D wavefields should improve the accurate, dip-independent estimation of these velocities.

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