A Study on Non-NMO Migration
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ABSTRACT
When we do conventional prestack Kirchhoff migration, a normal-moveout correction is automatically included, which results in the stretching of the seismic wavelet. Stretch makes the amplitude of wide-angle reflections questionable. An alternative migration method—the "Non-NMO migration", which is part of wide-angle processing, is studied in this project. The spectrum preservation of the propagating seismic wavelet is evaluated using both Non-NMO migration and conventional migration. Frequency analyses of migrated wavelets from synthetic 2D data show a substantial improvement for Non-NMO migration versus conventional migration.

Figure 3. Image traces of conventional migration and Non-NMO migration for different dip models. A) Dip = 0°; B) Dip = 12°; and C) Dip = 25°.

Figure 4. Spectra of the middle image traces in Figure 3 (red line) of both conventional migration and Non-NMO migration for different dip angles. A) Dip = 0°; B) Dip = 12°; and C) Dip = 25°.

Conclusions
Non-NMO migration reduces wavelet stretch compared with conventional migration. The spectra of migrated data are sensitive to dip and both the aperture size and its position relative to the image location.

Figure 5. The ray paths for the input traces and the common mid-point positions of the migrated traces.

One could expect from Figure 5, that when the image trace goes from left to right, its spectrum should approach the input trace better.

Figure 6. The spectrum for every other image trace in Figure 5. The blue curve is the spectrum of the input wavelet, and the red curves refer to the non-NMO migrated traces. Traces 1 in the left most trace, while number 25 the right most.