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An Application of CRS-Based Depth Imaging : Real Data Example

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Seismic migration method in time domain often cannot handle a complex geological condition, especially when velocities are quite heterogeneous not only vertically but also laterally. In order to tackle this problem and to provide an interpretable seismic section, migration in depth domain is conducted instead of migration in time domain. Kirchhoff migration is known as one of migration methods that use aperture size to restrict migration operators. Our objective is to conduct the Kirchhoff depth-migration for a complex geological condition, in which the aperture size is obtained from CRS (Common Reflection Surface) attributes. Moreover, the CRS attributes can also be used to determine a velocity-depth model which is required for depth migration process.

In the first step, CRS-stack method is carried out in order to extract the CRS attributes from multi-coverage dataset. The determined CRS attributes are then used to derive velocity-depth model using NIP-wave tomographic inversion. Results of the velocity-depth model and the CRS attributes are, in turn, utilized to conduct both post- and pre-stack depth migration.

In the post-stack depth migration, our experiment shows that CPU running-time is not much difference between the conventional and the minimum aperture migration method. However results of the minimum aperture show clearer image than those of the conventional method. This could be explained because the minimum aperture sum only amplitudes restricted to an area close to a stationary point and avoid summing noises or unwanted events. Similar to the post-stack case, clearer images are also found using the minimum aperture pre-stack depth migrated sections. Reflectors are seen more continuous and fault structure around CDP 3443 is more easily to be identified compared to conventional Kirchhoff migration.