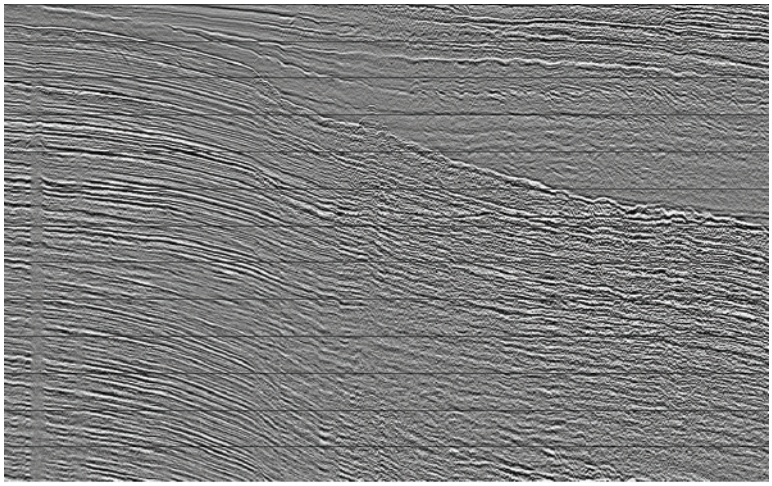
3D SRME | The Wide Azimuth Application

With wide azimuth data, much like conventional data, multiples present a significant data processing problem. One of the best techniques for attenuating multiples is true 3D Surface Related Multiple Elimination (3D SRME). This method uses the input data to build a model, of the multiple, and then subtracts that model from the input data. From the outset of the module development effort, ION has kept a true 3D design approach in mind, and this has made the application on wide azimuth data a natural fit. In the modeling phase, we build a model based on shot that take full advantage of all azimuthal data in the survey. The adaptive subtraction is achieved using a 2D operator that provides excellent multiple/primary distinction.



Near-trace marine section before 3D SRME (data courtesy of StatoilHydro)

ION's implementation deals with water bottom variations quite well. In cases of extreme water bottom rugosity, even in the case where there are steep walled canyons the algorithm has proven very capable at removing multiples. While this type of water bottom is not prevalent in the GOM, as wide azimuth data acquisition starts to find applications in other areas, this will become an even more important topic in multiple removal, and ION will be well ahead of the curve due to fundamentally sound design choices that have been made in the development of this data conditioning module.

Near-trace marine section after 3D SRME

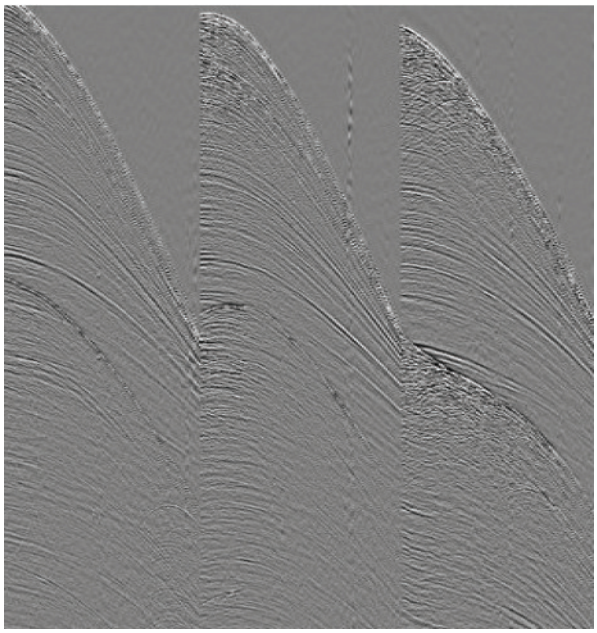
One of the multiple types that is well addressed by ION's true 3D implementation is the diffracted multiple, and with the even better data sampling found in wide azimuth data, this type of multiple is well addressed. The data samples to the left show the result of 3D SRME on a "typical" marine data set for three of the cables. The multiple that comes mid-record on the first full cable shown is well addressed, as is the out of plane multiple that is evident on the second and last cables.

THE MODEL BUILDING PHASE

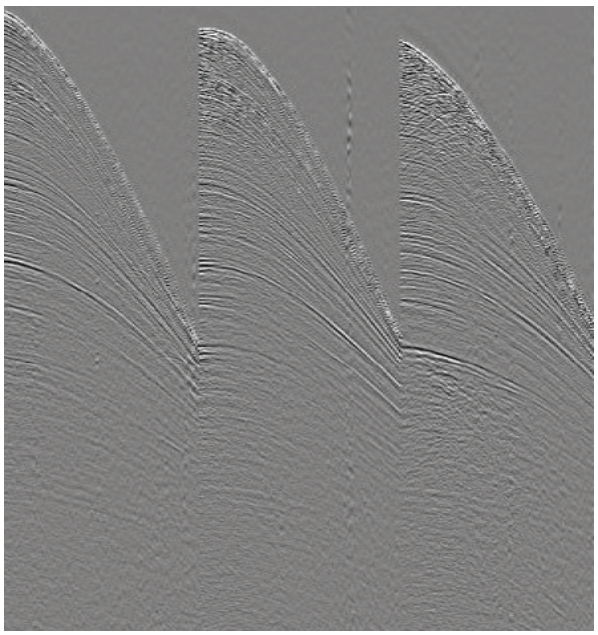
The model building phase used by the ION implantation of this algorithm is very well suited to wide azimuth data since the technique is implemented by building true 3D shots. In fact, this implementation will actually give better results due to the full suite of azimuths available in a WAZ survey. This technique also allows data from any size survey to be processed in a single pass. With this type of implementation, there are no seams or directional effects that could come about with a technique that requires either multiple blocks or multiple 2D passes in the model building phase.

THE ADAPTIVE SUBTRACTION

The implementation of adaptive subtraction an ION is a true 2D filter, working on ensembles, and as such, it allows a much better discrimination between the multiples and the primaries. The case where the data is steeply dipping also greatly benefits from the 2D nature of the adaptive subtraction. As with the model building phase, the adaptive subtraction phase is not limited by the size of the input survey, and as a consequence, we can achieve the best possible multiple attenuation across the entire prospect.



Input marine shot gathers. Before 3D SRME, after noise attenuation.



Input marine shot gathers. After 3D SRME and noise reduction.