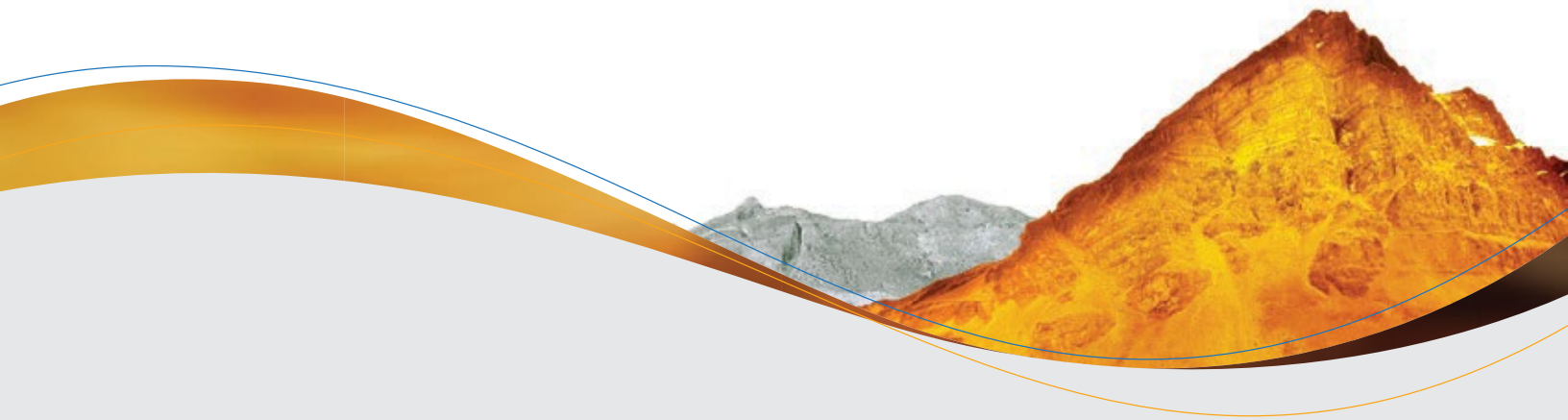


MultiFocusing imaging
Applications & Benefits

The Geomage patented MultiFocusing technology is a macro-model-independent technology that provides a cutting-edge alternative to conventional seismic processing. Conventional processing uses a single common midpoint gather and simplified velocity models. Yet a lack of data fold and inaccurate velocity analysis in conventional processing could significantly affect the accuracy of the subsurface model. More specifically, in areas of complex geology with low signal-to-noise ratio, a traditional seismic processing sequence results in an unreliable subsurface image. This may lead to inaccurate or erroneous interpretation.

Geomage's MultiFocusing is a highly effective method for addressing these challenges and may be the only method that is able to obtain data of sufficient quality for comprehensive geological interpretation in areas characterized by complex geology, high noise level or low-fold seismic data.

Improvement of Signal to Noise Ratio

During the MultiFocusing processing sequence, we take advantage of seismic data that were acquired but cannot be included in the stack by conventional processing. Our methodology includes wave fronts generated within the Fresnel Zone, and as such, we are not restricted to the simple NMO law that requires data summation of traces that have equal shot and receiver distance. We also measure the emergence angle of the wave front which provides us with a much more accurate dip and curved surface imaging. As such our methodology is especially suitable for low fold data and areas with low signal to noise ratio.

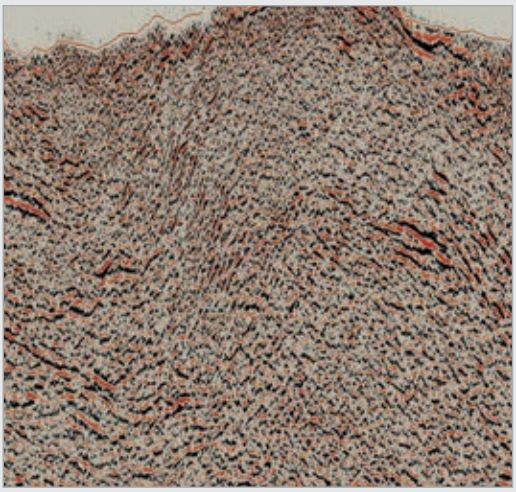
This leads to:

- Better structural resolution
- Better S/N ratio
- Higher frequency content (increased S/N ratio)

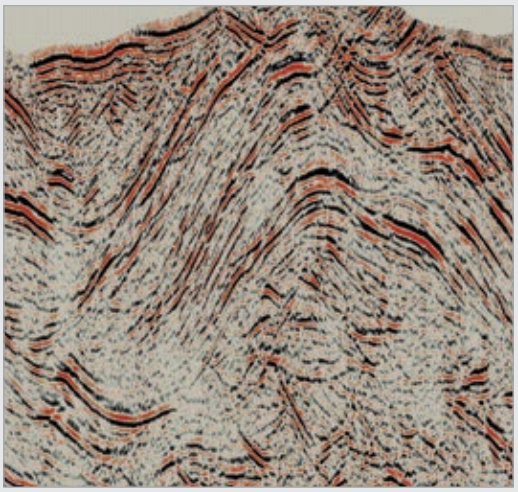
In addition to applying our process to stack data, we are able to produce enhanced pre-stack gathers. Our wave front parameterization is performed on topography and we are able to align individual reflectors within the gather more accurately. These datasets are amplitude-preserved and as such suitable for attributes such as AVO, AI inversion and simultaneous inversions, resulting in the following benefits:

- Cleaner data for attributes such as DHI, brittleness indicators, stress, etc.
- Enhancement of existing imaging procedures (PSTM / PSDM)
- Regularization of data in acquisition gaps
- Increasing accuracy and simplified velocity model building

Better Structural Resolution



Conventional Processing



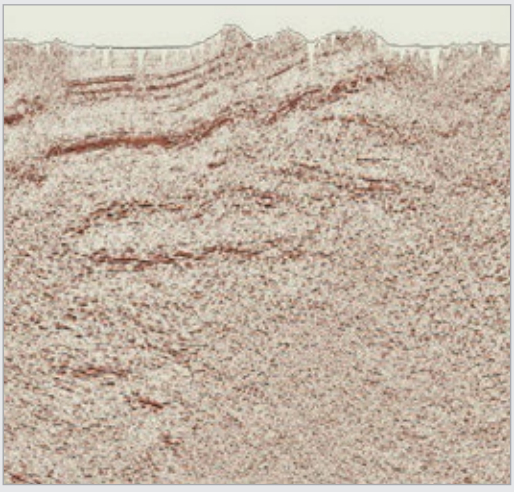
MultiFocusing Processing

Increased resolution at the near surface

Our imaging methodology produces datasets that display a higher resolution than conventionally processed data, within the first 1,000ms. We are able to include more wave fronts for higher offsets in our imaging gather, align the reflector better with our dip corrected velocity function that is derived from topography and have a better kinematic solution. Such products are especially useful for the following scenarios:

- Finding shallow drilling hazards
- Mapping shallow reservoirs
- Mapping faulting and possible gas chimneys at the surface.

Increased resolution at the near surface



Conventional Processing

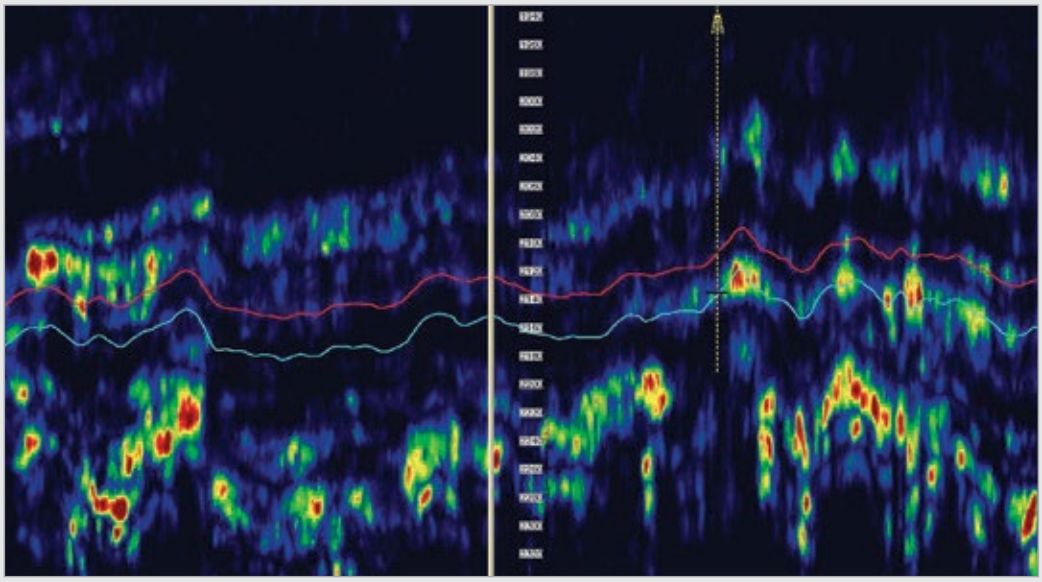
MultiFocusing Processing

Diffraction imaging

When a wave front hits an obstacle it bends, which manifests itself as a diffraction wave that in conventional processing is removed. We take advantage of this phenomenon and perform a MultiFocusing process on this diffraction energy. There is an apparent correlation between fracture, fracture density, faults and diffraction energy which we utilize. The products of diffraction MultiFocusing imaging are:

- Fracture detection – very relevant in un-conventional play types where the knowledge of natural fracturing is essential
- Fault detection
- Salt dome contouring

Diffraction Imaging

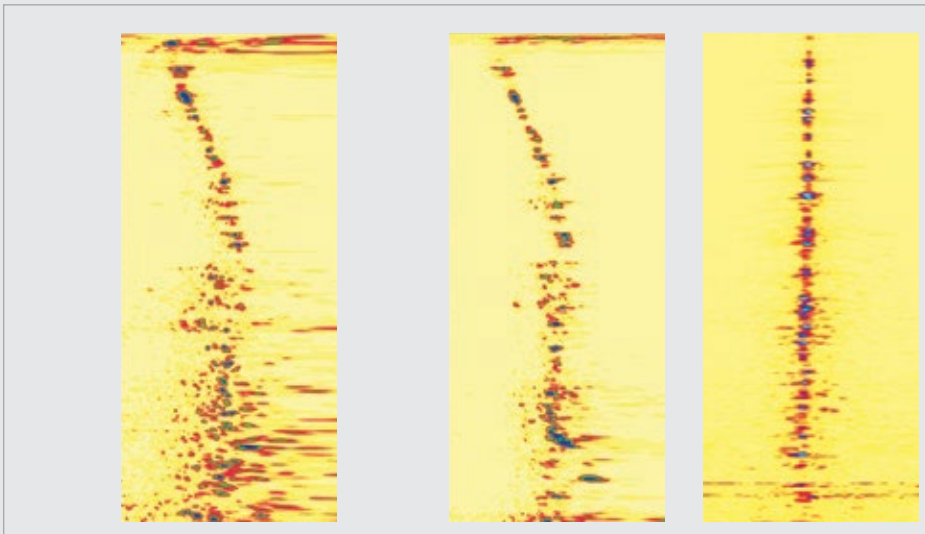


More accurate velocities

Geomage's MultiFocusing velocity determination methodology works from topography and has a better kinematic solution. The velocities are dip corrected and are calculated at every imaging point with no interpolation between picks. The resulting velocities are excellent for further processing like PSTM and PSDM.

More Accurate Velocities

Semblance Panels



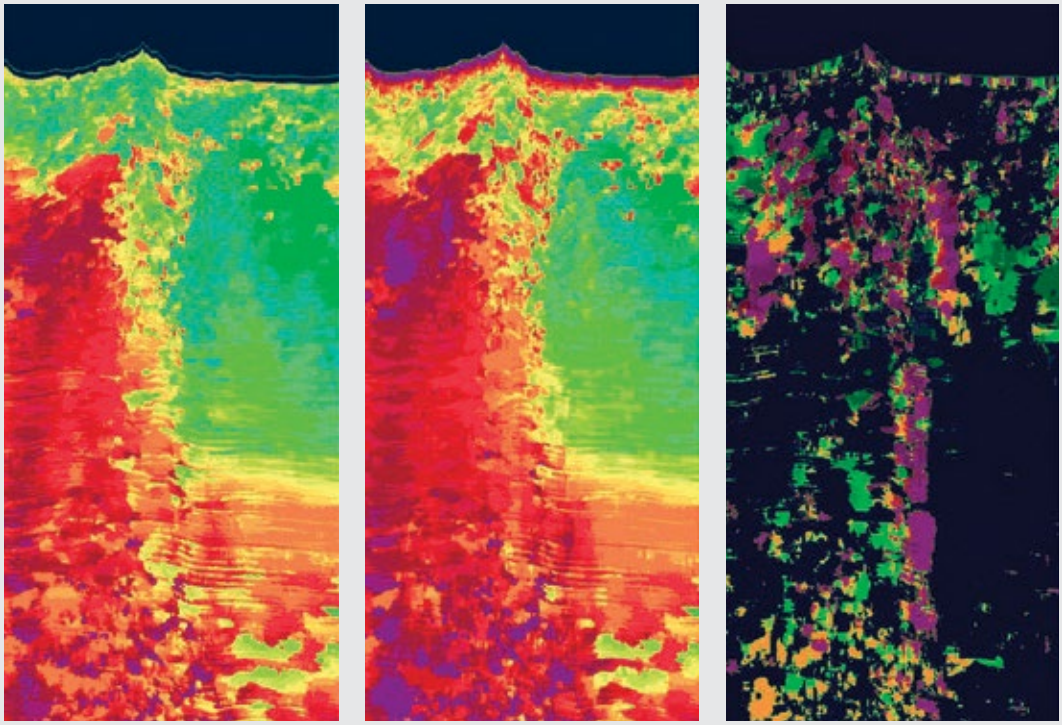
NMO Velocity | MultiFocusing Velocity | MultiFocusing Angle

Wave front anisotropy solution

In an isotropic medium, the wave front is spherical whereas in an anisotropic environment, the wave front is elliptical. MF allows for imaging these elliptic wave fronts along the azimuthal plane. The output of such a process is a slow velocity (Vslow), fast velocity (Vfast) and azimuthal velocity. We scan every available azimuth and therefore preserve the input azimuthal information. These velocities are especially useful for the following:

- 3D azimuth cube – indicates areas of anisotropy and therefore can be included in fracture prediction
- Preserving Azimuthal information – Conventional processing divides the azimuths into segments that are then either interpreted individually or have to be re-constructed. Geomage preserves the azimuth information and there is no need for such re-construction after the imaging.

Wave front anisotropy solution



V Slow V Fast V Azimuth

Geomage is a global company that develops and provides advanced seismic imaging technologies and services, as well as interpretation, geological modeling and reservoir characterization for a diverse range of oil and gas companies worldwide. Geomage's seismic processing portfolio is based on the innovative MultiFocusing technology, which has been used to deliver more precise imaging of the subsurface with better stratigraphic and structural detail for hundreds of exploration sites around the globe. For more information about Geomage, visit www.geomage.com.

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