

# Seismic Attribute Generation



## Geoscience Insights in 30 Days

Paradigm® is committed to providing oil and gas companies with high-quality geoscience services, to help them gain deeper insight into the subsurface and maximize the value of their assets. As part of our offering, we are happy to announce the availability of "Quick Turn" services, for specialized projects where qualified, on-time delivery is critical.

## Improve the Subsurface Image

Seismic data attributes provide the interpreter with new images that enhance the physical and geometric descriptions of the subsurface. Geometric attributes facilitate the definition of both the structural and stratigraphic framework of the seismic interpretation, while physical attributes may be used as direct hydrocarbon or lithologic indicators. When the seismic response is more complex, attributes may be used to drive advanced interpretation and analysis processes.

## Add Value to Interpretation

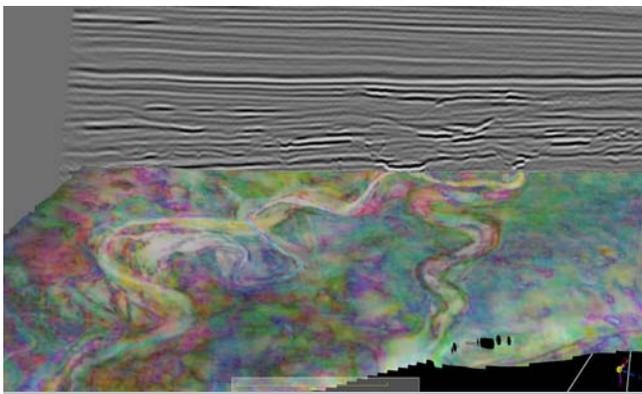
To meet the needs of traditional seismic data interpretation as well as more advanced and automated classification approaches, Paradigm has created a comprehensive library of physical and geometric attributes. A set of traditional Hilbert attributes is augmented by a large selection of derivative attributes, as well as seismic feature and content enhancement attributes, such as spectral decomposition, volumetric curvature, volume dip, volume azimuth, and Lightscape, a transformation for "illuminating" the subsurface. Together, they allow interpretations to proceed with more accuracy, confidence and value.

These attributes operate on the Paradigm Epos® integration framework, enabling them to service the full range of Paradigm interpretation, modeling and reservoir characterization solutions without time-consuming data imports. Most of the attributes can be generated on-the-fly, thus avoiding the need to call on special processing departments or create unnecessary intermediate files.

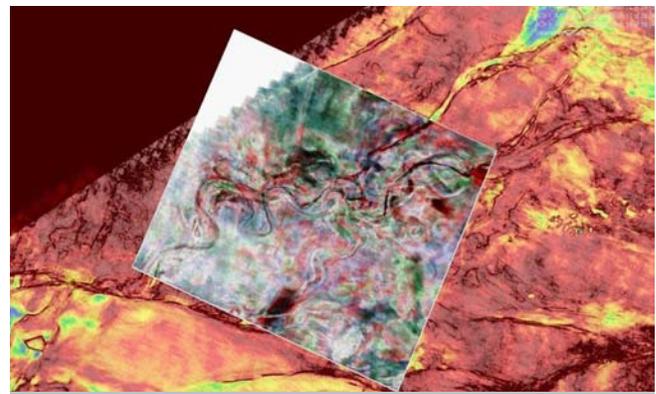
The Paradigm Geoscience Services team will take your poststack seismic volumes, in SEG-Y or Epos survey format, and process them into a suite of attributes that help maximize your understanding of the subsurface. We will then return them to you in Epos format for easy loading into your Paradigm suite, or in SEG-Y format.

## Paradigm Seismic Attribute Solutions

- Coherence Cube®: The original and still best patented algorithms for the delineation of stratigraphic and structural features
- Structural: Dip, Dip Azimuth, Discontinuity, Lightscape
- Curvature: A high-resolution approach to detecting and revealing high-resolution 'curvature' of reflectors in seismic volumes. A useful adjunct to Coherence Cube volumes.
- Complex Trace: Signal Envelope; Envelope Derivative; 2nd Derivative of Envelope; Instantaneous Phase; Cosine of Instantaneous Phase; Instantaneous Frequency; Instantaneous Acceleration; Weighted Mean Frequency; Thin Bed Indicator; Instantaneous Bandwidth; Amplitude-Weighted Instantaneous Phase; Amplitude-Weighted Instantaneous Frequency; Average Frequency
- Spectral Decomposition: Gabor-Morlet wavelet-filtered and 'frequency-cube' volumes
- Dip-Steered Enhancement: Structurally guided smoothing



▲ RGB blending of three frequency bands calculated with spectral decomposition



▲ Merge of signal envelope and coherency, with inset of an RGB blending display of spectral decomposition frequency volumes

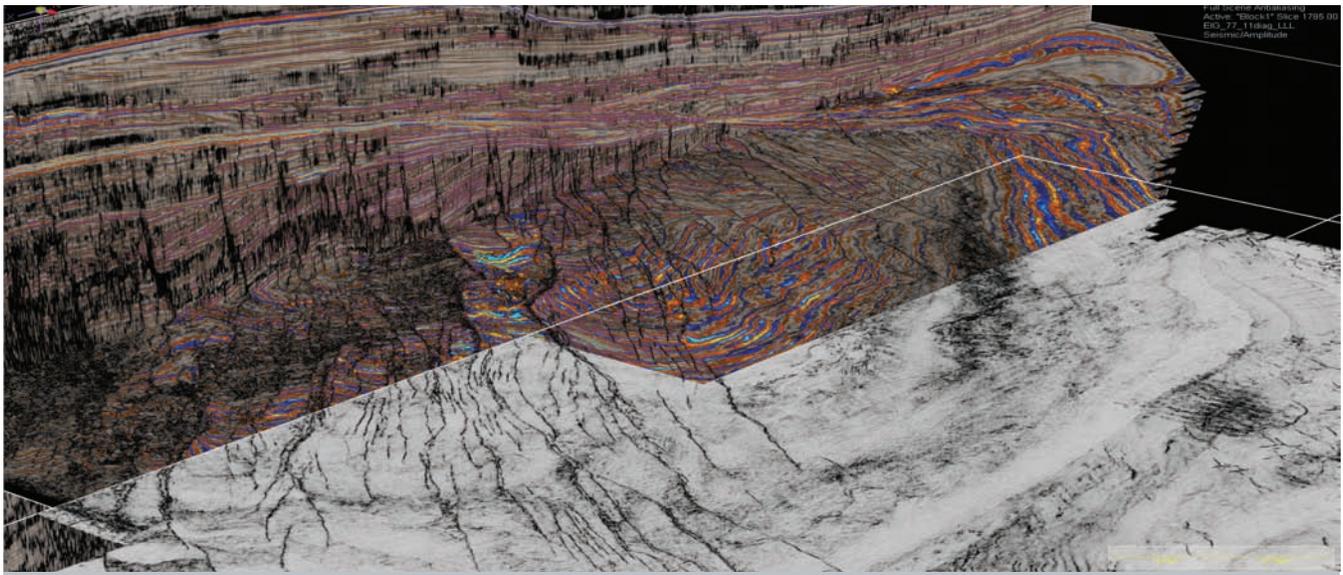
# Seismic Attribute Generation

## Paradigm Seismic Attribute Generation Advantages

- Seismic attributes are extremely useful for reservoir characterization geoscientists tasked with building static reservoir models through well log unification, prediction or classification procedures.
- Can serve as input to classification schemes, to reveal patterns and details that are not evident from standard interpretation or inspection of the seismic data.
- Can be used to predict desired log curves through a neural network inversion. The resultant property volume provides useful input for building or verifying geologic models.

## This “Quick Turn” Service provides added value to:

- Seismic interpreters requiring improved fault resolution or thin bed resolution
- Seismic interpreters requiring quick-look DHI attributes or seismic inversion attributes for prospecting and improved stratigraphic interpretation
- Seismic interpreters requiring improved wavelet resolution and improved signal to noise on their current seismic volumes



- ▲ Results of Coherence Cube processing on two adjacent volumes. For one survey, Coherence Cube is draped on the input seismic volume; for the other, only Coherence Cube is shown. Clear continuity of the structural trends is seen across the join between the two volumes.

## About Paradigm Geoscience Services

For over thirty years, Paradigm has been recognized for its industry-leading integrated technology and exceptional people. Our products have played a major role in finding and developing some of the largest oilfields in the world.

Combining our R&D strength and software interoperability with expert implementation, the Paradigm Geoscience Services team collaborates with our clients to provide complete solutions, from seismic and wellbore field data, to prospects, and drilling targets. Whether using proven and field-tested methodologies or new, innovative solutions, our best and brightest geoscientists deliver a highly collaborative, interactive and quality service offering. The advanced technologies offered by our Services group deliver more insights into the subsurface, enabling you to make better informed, timelier and more accurate decisions.

For more information about Paradigm Geoscience Services, please visit our Website: [pdgm.com/gs-services](http://pdgm.com/gs-services).