

# Shallow Geohazard Studies

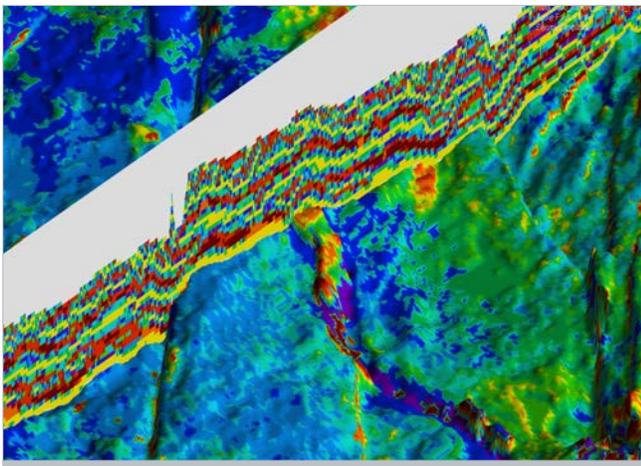
## An Emerson E&P Software Geoscience Service

Rapid sedimentary depositional rates in offshore deep water salt basins like the Gulf of Mexico can produce shallow subsurface geohazards that can significantly increase the risk and cost of drilling operations. These geohazards may take a variety of forms, including shallow water or gas flows, gas pockets, reactivated faults, gas chimneys, overpressure zones, unconsolidated sediments, and unstable slopes. Additionally, drilling through environmentally sensitive seafloor surface areas occupied by benthic communities must be avoided. To mitigate these safety and costly drilling risks, various methods are required to image, visualize and isolate potential shallow drilling hazards.

Emerson E&P Software solutions include a suite of seismic characterization and modeling technologies that allow geoscientists and drilling engineers to resolve geohazard conditions. Our experts work with offshore operators to understand the sources of shallow geohazards in order to image, resolve, model, and evaluate potential geohazards. Using data integration and co-visualization strategies, geoscientists can evaluate the physical and structural conditions of the shallow subsurface, and construct geologic models from these special seismic imaging techniques to plan safe wells.

### Emerson Geohazard Detection Solutions

- Geohazard feature (e.g. channels, faults) delineation using a collection of seismic attributes, including complex trace attributes, spectral decomposition, volumetric curvature, Coherence Cube®, and fault likelihood.



▲ Seismic facies classification for improved shallow facies and fault delineation

- Shallow facies determination using supervised or unsupervised seismic classification procedures, including waveform-based facies classification (Self-Organizing Maps) and multi-attribute classification (e.g. hierarchical).
- Spectral Decomposition as an attenuation indicator and seismic inversion methods to detect low impedance zones. Outcomes from both solutions can be indicators of hazardous shallow gas and unconsolidated sediments.
- Chronostratigraphic modeling and paleo-flattening for feature recovery and detection.
- High-resolution co-visualization (voxel-based) of seismic attributes and chronostratigraphic models.

### Emerson Geohazard Detection Service Advantages

- Combines feature detection attributes with high-end visualization and chronostratigraphic modeling, for high-resolution shallow imagery of the subsurface.
- Adapts advanced methods (seismic classification, voxel-volume interpretation, data merging, chronostratigraphic modeling) to shallow geohazard imaging and modeling.
- Commercial software is available to facilitate project collaboration with geologists, geophysicists, and drilling engineers.



▲ Shallow stratigraphic and structural features in paleo-space



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