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Integration and 3-D Visualization of Multiple Geophysical Data Types Yields Enhanced Geohazards Interpretations in Deepwater Portion of Northern Gulf of Mexico

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This presentation shows the results of a visualization method used to display and analyze multiple data types in a geospatially referenced three-dimensional (3-D) space. A deepwater exploration prospect on the Sigsbee Escarpment will be high-lighted as an example of the technique's application. The integrated data types used in the analysis included those normally used for drill site clearance and shallow hazards analysis, including high-resolution 3-D seismic, sidescan sonar, subbottom profiler and multibeam echo sounder. Oxygen isotope age dating data from nearby geotechnical boreholes were also incorporated to estimate amounts of overburden removed by erosion and evaluate the potential for anomalous shallow pressures at location. In addition, interpreted geohazards maps were draped on bathymetric models to show the spatial relationships between topography and various geohazards including seafloor and buried faults, shallow gas indicators and seabed anomalies.

Multiple drill sites were assessed efficiently and the best location for reducing drilling hazard risks was selected. As a result of using the data integration and visualization method, all data types were simultaneously evaluated. A better understanding of the information evident on each of the various datasets was gained more efficiently in comparison with traditional analysis methods. For example, a shallow high-amplitude seismic anomaly potentially representing a gas accumulation was mapped and subsequently displayed in three-dimensional space to select a well path for avoidance of the anomaly. Similarly, considerations for future field development opportunities were evaluated prior to drilling the initial exploratory well to contribute to a rapid development pace.