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Identification of Deepwater Gulf of Mexico Gas Hydrates - From Seismic Prediction to Joint Industry Project Drilling and Coring

A major challenge facing the Department of Energy Gulf of Mexico Gas Hydrates Joint Industry Project (JIP) is the development of protocols and laboratory tests for acquisition, processing, and interpretation of seismic data to image gas hydrate zones better. The acquisition parameters and survey design of exploration 3D seismic are not optimized for shallow sediments and do not allow accurate characterization of naturally occurring hydrates. Gas hydrate affects the elastic properties of sediment, and the combination of rock physics data, including lithology, pore fluid, hydrate content, and pressure, with seismic modeling will allow improvements in seismic gas hydrate characterization. A rock physics transform between elastic properties and the concentration of hydrate in pore space will generate new geomodels and synthetic seismic to define an optimal seismic acquisition and processing sequence for gas hydrate delineation. The new protocol will be applied to reprocessed 3D pre-stack seismic data and used to interpret and map gas hydrate features and rock properties in the deepwater Gulf of Mexico.

The goal of Phase 2 of the JIP is to drill and core as many as two dozen 1,500- to 2,000-ft scientific research test wells through bedded hydrate deposits in the next year. The results of seismic modeling and analysis will be an important factor in selection of the hydrate core collection sites. These deep stratigraphic test wells will provide the first real calibration of geophysical data for characterizing buried gas hydrates in the Gulf of Mexico.