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Integration of Outcrop, Process Models and High Resolution 3-D Seismic in the Development of the Holstein Field, Deepwater Gulf of Mexico: A Subsurface Analog for Pondered-Basin Turbidite Reservoirs

The Holstein Field is currently under development in the deepwater Gulf of Mexico with the pre-drilling of selected development wells prior to production. Reservoirs comprise stacked, turbidite sheet sands deposited in a ponded basin above salt. With minimal appraisal data prior to development, a greater emphasis was placed on integrating outcrop analogs and process models with spec 3-D seismic data to plan development. Proprietary high resolution 3-D data and new drilling results have validated models and permitted the refinement of facies and permeability models to evaluate options for future reservoir management. Holstein in turn provides a 3-D subsurface analog for exploration and development.

Topographic and structural controls on sedimentation are evident in a variety of bounding surfaces and margins on 3-D seismic. These are trap analogs for exploration and also keys to facies and permeability prediction for further development. In a series of punctuated depositional episodes, common vertical sequences and facies associations demonstrate evolving intrabasinal, topographic controls from highly-confined to less-confined. Extrabasinal controls influence depositional frequency and rates; higher rates erasing topographic confinement and reduced rates enhancing it.

With high well costs in deepwater, the challenges remain focused on well count, placement for high rates, timing, recovery efficiency, and injection sweep efficiency. A variety of models contributes the greatest value to the development phase and beyond into the operations phase to generate reservoir management options.