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High-Resolution 3D Seismic Imaging of Ponded-Basin Turbidite Reservoirs at Holstein Field, Deepwater Gulf of Mexico: Insights to the Interpretive Process for Reservoir Risk Mitigation

The Holstein Field is a 350mmboe development in the Gulf of Mexico in water depths exceeding 1300 meters. Reservoirs comprise multiple, stacked turbidite sands deposited in a ponded basin above salt.

With a variety of stacked, thin reservoirs, it is critical to understand both the three-dimensional organization of flow units and the spatial distribution of facies and permeability to populate a reservoir model. At Holstein, this was even more important by the adoption of a water injection program to prolong rates and maximize recovery efficiencies. Stochastic solutions are good for managing risk, but accurate deterministic solutions, when possible, can deliver a robust base-case scenario. With the majority of reservoirs below resolution on conventional seismic data, a high-resolution 3D survey was justified at Holstein by the cost and risk profile. For example, at \$20million per well, accurate placement is essential. Although imaging and resolution were significantly enhanced on this dataset, sound depositional models, well data and analogs remain integral to understanding and mapping facies architectures - in essence: getting it right.

What do we look for when considering sedimentology in the interpretation of the dataset? Examples include: the geometry of bounding surfaces (margins, tops, bases), attributes, and structural and topographic context. Holstein's 3D dataset provides a step-change improvement in resolution and may serve as an analog for other oil and gas fields. At high resolution, these insights to the interpretive process (both enhancements and limitations) may assist lower resolution approaches.