

# **Integrating Geology and Velocity Data to Constrain Pressure Prediction in Foldbelts: An example from the Perdido fold belt, Gulf of Mexico**

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## **Abstract**

This paper focuses on the first drilled prospect in the Perdido fold belt, deepwater Gulf of Mexico. The original test well, AC600-001, did not reach its objective, but encountered shallow hard geopressures and the well was lost. That result was unexpected. The seismic velocity trend and data from previous deepwater wells suggested near hydrostatic pressures. To drill a second well, the problem of finding an optimal well location that avoided low drilling margins was addressed. The work involved re-picking of seismic velocity, trend analysis, and developing end-member rock models for pore pressure prediction using constraints from a mechanical seal failure analysis.

Areas of higher velocity, and hence lower predicted overpressure were identified in the same stratigraphic interval that the first well was lost. The second well was drilled successfully through one of these areas. The velocity results, combined with constraints from top seal failure were used to construct drilling margin maps. These indicated that beneath the stratigraphy where the first well was lost, drilling margin would increase. Once a path was found through the shallow hard pressures, the well would be drillable to objective. Results from the second well show that pressure prediction using seal failure arguments is a good first approach. The re-picked seismic velocity data at the well location was fast as compared to the checkshot data, but within error. The methodology is limited by assumptions on sand continuity from top seal failure locations and by velocity fidelity.

Hard overpressures and top seal failure are common aspects of deepwater fold belts. These prospects can be hard to drill and can be under-filled. Deepwater foldbelts often have little well control to constrain predictions within them. The techniques presented here can be adapted to other foldbelts, and were used to evaluate and rank other Perdido prospects.