THE 4TH GEOLOGICAL CONFERENCE
OF
THE GEOLOGICAL SOCIETY OF TRINIDAD AND TOBAGO
June 17-22, 2007, Hilton Trinidad & Conference Centre
Port-of-Spain, Trinidad and Tobago

"Caribbean Exploration – Planning for the Future"

ABSTRACT

SHELF-EDGE DELATA SYSTEMS: RESERVOIR PREDICTION CHALLENGES FOR DEEP TARGETS IN THE COLUMBUS BASIN

Diego Sanabria, Jeawan Bhajan, Robert Elliot
BP Trinidad and Tobago LLC

Reservoir prediction for shallow normally pressured prospects in the Columbus Basin has been relatively straight forward for bpTT. The depositional model that serves as the basis for reservoir prediction is primarily based on analogies drawn between deposits from the last sea level lowstand and older hydrocarbon bearing deposits. In general terms, good reservoir sands are associated with shelf-edge delta deposits interpreted to be the result of deposition during sea level lowstands. Stacking patterns for these shelf-edge deltas are a function of the interplay between sediment input and extensional deformation. For the most part, depocenters are located where counter-regional/regional fault systems generate accommodation space. These reservoirs are generally associated with high-amplitude reflectors that enable us to differentiate them from more mud-prone deposits in the slope. While this reservoir prediction paradigm has worked fairly well in the normally pressured part of the section, recent exploration efforts in bpTT suggest that deep overpressured portions of the basin are more difficult to predict.

The Coconut and Ibis Deep exploration wells have reinforced the notion that there is an increased level of complexity in the prediction of reservoir as the industry moves to deeper targets in the Columbus Basin. Coconut met limited success in reservoir prediction and Ibis Deep failed due to lack of reservoir sands at the target levels. Some of the high amplitude reflectors associated with exploration targets were caused by alternating tight siltstones and overpressured shales. While the depositional model is still a sound paradigm, bpTT is currently making advances in understanding seismic rock properties to address the complexity of reservoir prediction for deep exploration targets.

Overpressure softens the sand and shale properties at depth, enhancing hydrocarbon-based DHI's and accentuating a typically weak Class III AVO character. Intrashale pressure ramps can exhibit the same high amplitude character but might be distinguished by Class IV AVO and a pronounced enhancement at low frequencies. Extended elastic impedance techniques developed within BP offer promise in optimizing seismic rotations to discriminate high-amplitude silt-shale and shale-shale pressure ramps. This aspiration can be advanced through longer-offset towed streamer or OBC acquisition.