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Abstract

**STRUCTURAL CROSS-SECTIONS OF THE COLUMBUS BASIN, TRINIDAD & TOBAGO:
AN INTEGRATED GEOLOGICAL MODEL BASED ON A COMPREHENSIVE 3D SEISMIC
DATABASE**

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bpTT has built an extensive 3D seismic data base in the Columbus Basin, much of which has been reprocessed using pre-stack time and depth migration and convolved to one “mega-merge” survey. Together with one of the most extensive well datasets of offshore Trinidad, bpTT has a comprehensive database with which to draw upon for regional and sub-regional interpretation. As part of ongoing geological work in the Exploration Team, a series of 12 regional cross-sections has been developed. The sections have been designed to cross key structural trends and accumulations in the basin, drawing on all available 3D seismic and wells, and in addition, regional 2D seismic lines as necessary.

Eight ‘dip’ lines and four ‘strike’ lines are presented in this poster, traversing the Columbus Basin; from the Columbus Channel in the west to the deepwater area to the east, and the Darien Ridge in the north to the Plataforma Deltana area in the south. In addition, the sections have been combined in a 3D fence diagram model using 4DVista. As each section is based primarily on 3D seismic, they show sufficient detail to see the key faults involved in the main oil and gas accumulations in the basin. The stratigraphy is shown using a simplified colour-scale, enabling rapid assessment of the structural evolution of different structures through time.

The cross-sections illustrate the two dominant sets of regional and counter-regional extensional faults that detach above the “Pre-Orinoco” Lower Miocene to Paleogene stratigraphy. Sediment-load related gravitational-collapse of the shelf margin in the Early Pliocene initiated in most of the central and northern parts of the basin on W-dipping counter-regional faults, the footwalls of which translated eastwards above the detachment. This enabled the capture of the prograding sediments of the Orinoco delta in the counter-regional fault hangingwalls. However to the south, E-dipping regional faults were dominant throughout the basin development. The underlying Paleogene-Cretaceous stratigraphy imparts a control, as down-to-the-basin steps are loci for the major overlying regional extensional faults. The major faults (regional and counter-regional) are associated with synthetic and antithetic faults,

and leads to complex cross-cutting relationships in the conjugate fault evolution, particularly at deeper stratigraphic levels. The sections in the northern part of the Columbus Basin also illustrate the impact of the Plio-Pleistocene transpressional-related folding adjacent to the Galeota and Darien Ridges, and the underlying uplifted Paleogene – Cretaceous section. However there does not appear to be a simple relationship between the inversion at shallow levels (such as at Teak) with that of the deeper, Pre-Orinoco thrust sheets.

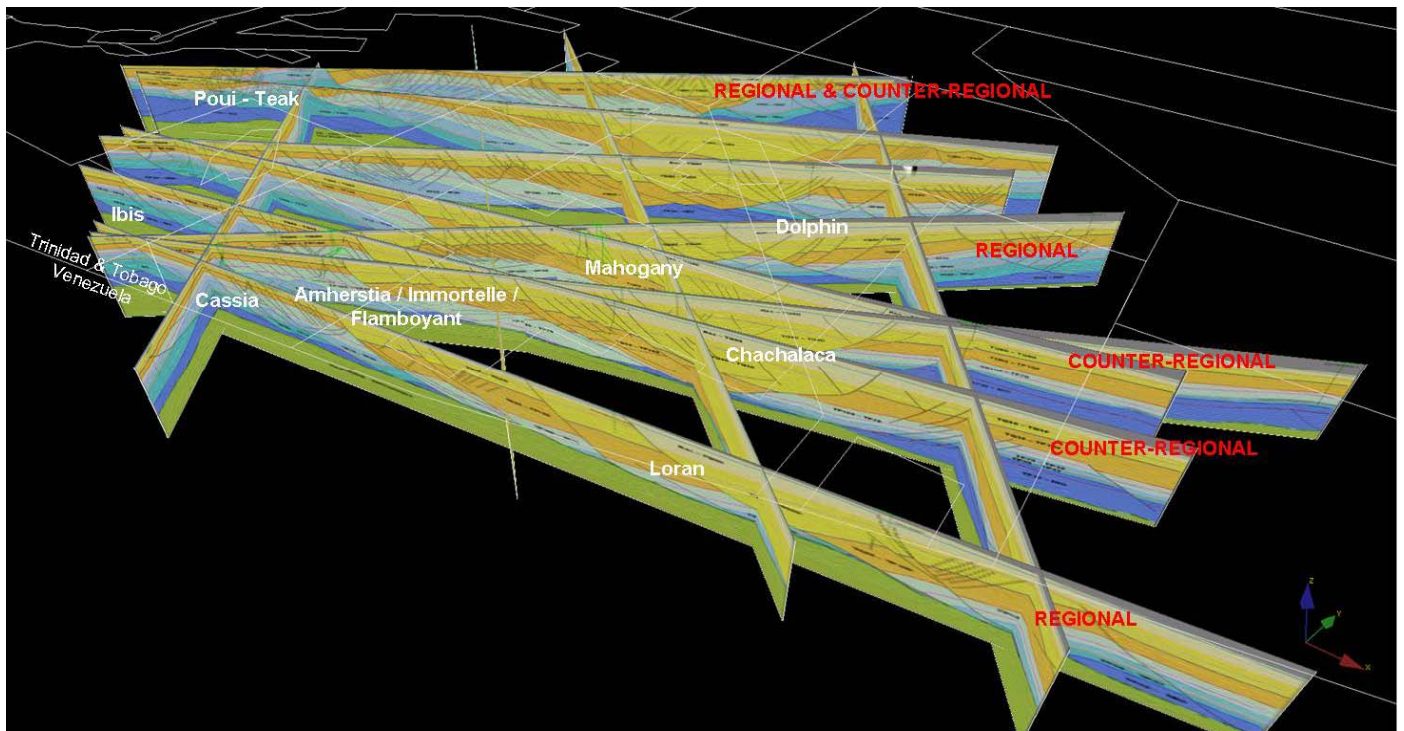


Figure 1. Columbus Basin regional cross sections in 4DVista model, looking NW.

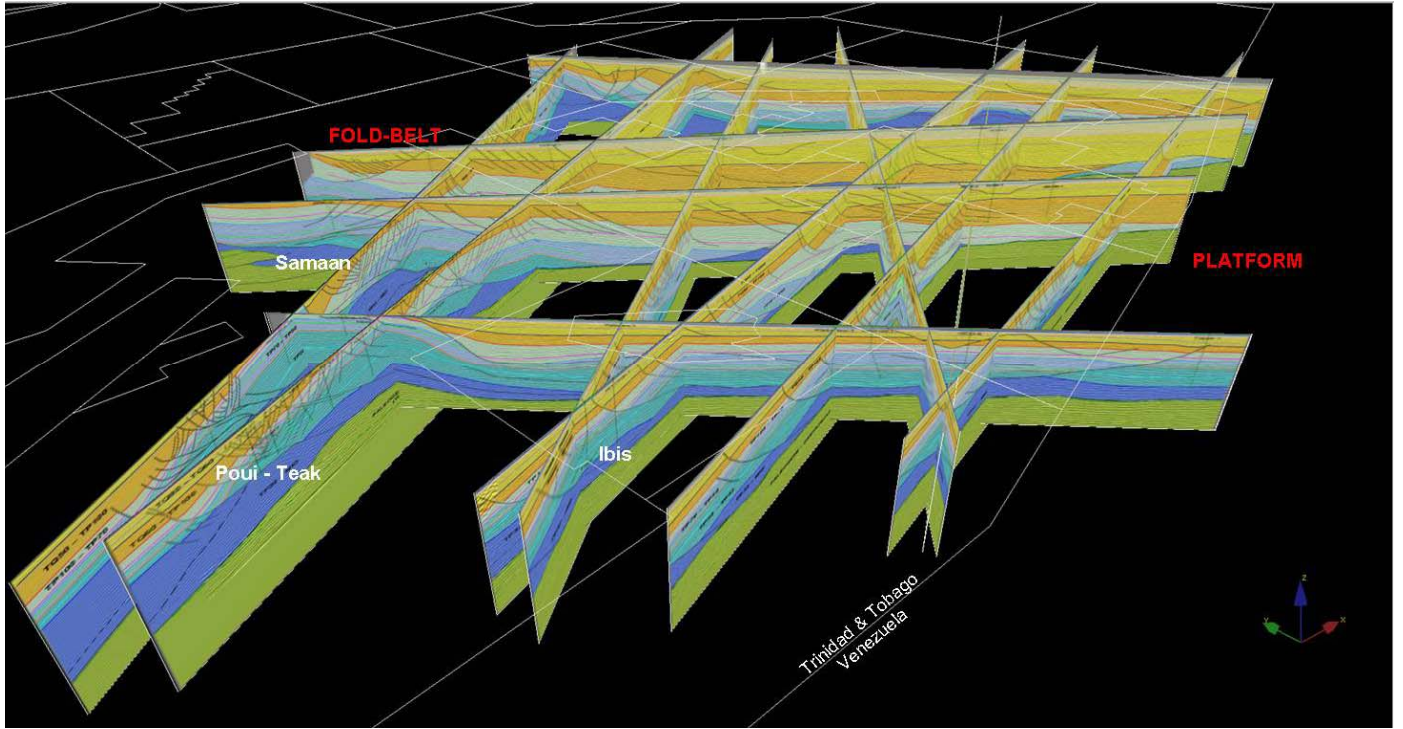


Figure 2. Columbus Basin regional cross sections in 4DVista model, looking NE