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ABSTRACT

3D ANATOMY OF THE COLUMBUS FORELAND BASIN, EASTERN
OFFSHORE TRINIDAD

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The Columbus foreland basin is the easternmost expression of ongoing, oblique collision between the Caribbean and South American plates. From 2001-2005, the DM2 industry-funded consortium at the University of Texas integrated a variety of data sets including deep penetration 2D seismic lines, 10,708 km² of 3D seismic data, well data, and lithologic and geochemical analyses from shallow cores. Main results include: 1) the Darien ridge is a thrust-imbricated sedimentary wedge formed as a result of underthrusting of the passive margin of South America beneath the encroaching igneous-metamorphic rocks of the Caribbean arc; deep penetration 2D seismic images show the lower plate at depth beneath the Darien Ridge; 2) depression of the underthrust lower plate has produced an asymmetrical accommodation space now filled by 14 km of Miocene to Recent sediments; 3) widespread shale diapirism is linked to loading of late Miocene-early Pliocene muds; 4) early Pliocene-recent normal faults along the shelf margin are controlled by oversteepening related to the formation of the foreland depression; rifting at the shelf edge provides point sources for shelf and slope material to enter the deep basin; 5) analysis of 3D data reveal cycles of MTCs, turbidites, channels, and fine-grained condensed section deposits controlled by periodic, perhaps seismogenic, collapse of the shelf edge; 6) shallow cores and existing wells indicate the presence of hydrocarbons on the Darien Ridge and the shelf margin; the potential of the deepwater area of the basin depends in part on the existence of migration pathways through the 6-km-thick Plio-Pleistocene section.