# Along-Strike Sediment Transport is an Underappreciated Control on the Pleistocene Sedimentary Record Offshore East Coast Trinidad

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## Abstract

The present-day northeast South American margin is one of a few locations in the world where a strong and persistent, unidirectional current flows along the continental shelf for considerable distances and plays a significant role in sediment distribution along the margin. The north to northwest directed Guyana Current transports sediments up to ~1,600 km along the margin from as far south as the Amazon River mouth to Caribbean basins. We describe the Pleistocene source to sink marine depositional systems of the eastern offshore Trinidad area using a sequence stratigraphic framework to characterize the progradation and/or retrogradation of the margin through time. We use ~9,000 km2 of 3-D seismic data and 10,000 km of 2-D seismic data, combined with well penetrations and bathymetric data to examine the role of dip parallel versus strike parallel sediment transport systems. Attribute extractions on the seafloor and key horizons, and regional transects traversing the margin, allow us to identify and study the properties of sediment transport pathways including submarine channel systems. We propose that during sea level high stands, along-strike sediment transport systems driven by the north-directed Guyana Current have a significant influence on the shelf environment. The persistent and unidirectional Guyana Current is responsible for strike-parallel incisional bedforms (<1–4 km wide) on the seafloor, particularly in areas where paleo and active structures generate relief at the seabed. The current also contributes to the movement of sediments derived from the South American margin to the Columbus Basin shelf and subsequently into the Darien, Barbados, North Coast and Tobago Basins, to the north. During low stand sea level conditions the margin is dominated by downdip transport of sediments from the Columbus Basin shelf to the deep basin, through a series of downdip oriented channels that range from ~0.5 – 4 km in width and are concentrated in synclinal axes approximately parallel to depositional dip. An understanding of the controls on changing patterns of sediment distribution along a margin has implications for predicting the locationand geometry of prospective reservoir horizons in both shallow and deep marine basins.