Plant remains in recent deposits of the Orinoco fan: a direct evidence of hyperpycnal discharges of the Orinoco river.

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Abstract

According to its original conception, turbidites have been related to slope instability of previously accumulated shallow water deposits. These are intrabasinal (I) turbidites, since the parent flow originated by a subaqueous sediment failure within the basin, and are characterized by an interstitial fluid having a similar density respect to the ambient water. In recent years, growing evidences support that turbidites can also be originated by direct discharges of rivers in flood. These fluvial discharges (via hyperpycnal flows) accumulate extrabasinal (E) turbidites, since the parent flow is originated on land, and is composed of interstitial freshwater. Intrabasinal turbidites, related to slope instability, are affected by several hydraulic jumps and flow transformations during its travel basinward. They are characterized by a fast moving head with high flow entrainment. On the contrary, pure Extrabasinal turbidites are fully turbulent flows, characterized by a slow moving head and limited flow entrainment. The last result in the common occurrence of extrabasinal light components (as plant debris and charcoal) in the related deposit, which are derived from the fluvial parent flow. The occurrence of plant remains is now considered a diagnostic criteria for the recognition of extrabasinal (hyperpycnal) turbidites. Main plant bearing hyperpycnal facies are medium to fine grained sandstone beds showing low angle asymptotic cross stratification, massive and laminated bedding, climbing ripples and lofting rhythmites. Studies of the Orinoco fan performed by IFREMER and IFP during the CARAMBA survey (2002) revealed abundant plant material in cores of deepwater Holocene turbidites, associated with typical features of hyperpycnal deposition (lofting rhythmites). These recent deposits were compared with Miocene and Pliocene strata outcropped in the Southeast Trinidad, giving new perspectives to the understanding of accumulation of sandstone deposits in the Columbus Basin.