

The Composite Bed: A New Distinctive Feature of Hyperpycnal Deposition

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The hyperpycnal system is the subaqueous extension of the fluvial system. Related deposits are hyperpycnites. Although recent hyperpycnites are almost fine-grained, increasing evidences support the occurrence of coarse grained hyperpycnites in the fossil record. This study is based on field and core studies in several South American basins. Coarse grained hyperpycnites associated to large rivers are accumulated from a particular kind of shallow to deep water river-fed turbidity current having very distinctive characteristics that include: 1. an origin related to long lived and quasi steady flow of fluctuating energy; 2. presence of fluvial-derived bedload at the lower flow interface; and 3. a turbulent flow having interstitial freshwater. These characteristics result in the deposition of composite beds, which are very distinctive and internally complex clastic bodies showing a facies arrangement that strongly departs from those predicted by conventional models of turbidity sedimentation. Composite beds typically display a vertical succession of different lithofacies showing cyclical recurrences and transitional to sharp passages between them. These cyclical and gradual changes are the result of a near-continuous deposition from a quasi-steady turbulent flow. Composite beds can be very thick (up to 70 meters) depending on the duration of the related hyperpycnal flow and the available accommodation space. Other common attributes of composite beds include internal and laterally discontinuous erosional surfaces, scarce burrowing and a basal coarsening upward interval. In marine environments composite beds evolve laterally into lofting rhythmite packages. Recognition of composite beds suggests both a hyperpycnal origin for the deposits and the occurrence of clastic packages filling the topographic lows within the basin. The last can induce substantially changes in the exploration of many lacustrine and marine basins.