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LOFTING RHYTHMITES: A DIAGNOSTIC FEATURE FOR THE RECOGNITION OF HYPERPYCNAL DEPOSITS

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Hyperpycnal systems are the subaqueous extension of fluvial systems (Zavala et al 2006). They originate when sediment-laden fluvial discharges enter a less dense standing body of water. In the case of marine environments, sediment-carrying freshwater discharges contain a fluid that is less dense than ambient sea water. Consequently, when the hyperpycnal flow progressively loses part of its suspended load, the current will eventually lift from the substrate through buoyancy reversal. This process is known as “lofting”, and has been firstly documented by Sparks et al. (1993). Hesse et al (2004) were the first in recognizing lofting-related facies associated with ice-rafted debris in Pleistocene deposits of the Labrador Sea. The recognition of lofting facies in marine environments is extremely important, because it allows the diagnosis of a direct fluvial connection and hyperpycnal origin for the associated deposits. This paper document for the first time the main characteristics of lofting facies, from ancient examples of different Argentine and Venezuelan basins. Lofting facies (hereafter lofting rhythmites) are composed of thin couplets of massive siltstones and sandstones, separated with thin intercalations of plant debris and micas. Individual levels are often up to 2 mm thick and show an exceptional lateral continuity that can exceed hundreds of meters. Silt/sandstone couplets and their intercalations integrate laminated and dm thick packages separated with massive mudstones. These laminated packages lack or show rare and poorly diverse ichnofaunas. Lofting rhythmites appear isolated between mudstone successions or locate towards the top of massive to laminated tabular sandstone beds. Typically, these sandstone beds lack climbing ripples (Bouma's Tc division) on top. The absence of climbing ripples could relate to the flow lift-up due to lofting reverse-buoyancy processes before reaching the velocity field for ripple formation. Consequently, the hyperpycnal flow detached from the bottom settles its suspended load forming silt/sand couplets. The great dispersion of lofting rhythmites makes them a useful feature to recognize the lateral occurrence of hyperpycnal channels and lobes by core studies. In addition, lofting rhythmites constitute a non biological indicator of saline environments.

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