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Turbidite Bed Thickness Distributions And Submarine Fans Architecture, Examples From The Lower Cloridorme Formation, Québec Appalachians

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ABSTRACT

Several statistical distributions have been suggested for turbidite bed thickness. The type of distribution has been used to identify submarine fan subenvironments and processes operating in them. In recent years, the power-law distribution has been suggested for many turbidite successions. Departures from a power-law distribution have been used to suggest erosion or amalgamation of beds. It is claimed that environments dominated by different processes may be characterized by the degree to which these processes have caused departures from the assumed power-law distribution.

More than 27,000 beds were measured and analyzed from the lower Cloridorme Formation, Québec Appalachians to investigate which distribution best fits the data and to gain insight into depositional processes and subenvironments. The lower Cloridorme Formation, was deposited in a deep-marine setting akin to modern basin plains and distal submarine fan systems. Results show that the bed thickness distribution varies from lognormal for sandstone beds and exponential for siltstone beds. The observed type of distribution in many cases is a summation or a mixture of subpopulations. Some of the bed-thickness populations approximate power-law distribution with a scaling parameter ranging from 1-2, but like many other turbidite sequences, the fit to a power-law only applied to a subset of beds that represent a small part of the population. Thinner beds that form a greater part of the population might also follow a power-law distribution but have a much smaller power-law scaling parameter than the associated thicker beds. A comprehensive understanding of the depositional conditions and the factors that control the thickness of beds is required before attempting to infer submarine-fan subenvironments, reservoir potential, sand bodies geometry and triggering mechanisms for turbidity currents from bed thickness distribution.