

Flocculation and fine grained turbidites

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A simple conceptual model of the depositional environment of fine grained turbidites using a "floc limit" interpretation is presented. The grain size for which the residence time of particles in suspension equals the aggregation time is called the "floc limit", because it marks the boundary between floc-deposited and single-grain-deposited sediments. Grains smaller than the floc limit arrive at the seabed in flocs; grains larger than the floc limit arrive as single grains.

There are two principal controlling factors in the deposition of fine grained sediments, gravitational settling and flocculation. Flocculation, or particle aggregation, is the process in which small, slowly sinking particles collide and adhere with other particles in suspension, thus forming larger, faster sinking aggregate particles or flocs. The principal control in aggregation is the collision rate of particles, which is most strongly influenced by the particle concentration.

Fine grained turbidites are among the most abundant

sediment types recovered from the Deep Sea Drilling Project. They form thick sequences on prodelta slopes, deep sea fans, continental rises and abyssal plains. Fine grained turbidites are gravity-current deposits. Turbidity flow competence is generally determined by the density (or particle number concentration) differences between the ambient sea water and the suspension. Describing the proximal to distal trends in the floc limit of turbidites serves two purposes. First, a comparison of the observed and predicted trends in the floc limit will demonstrate the potential and limitations of the concept for the interpretation of depositional environments of fine grained sediments. Second, the observed trends in the floc limit will clarify which variables play the greatest role in setting its value. The model predictions are compared to the observed floc limit trends of Wisconsinan fine grained turbidites from selected cores of the Laurentian Fan and Sohm Abyssal Plain.