



Super- and subcritical turbidity currents and their deposits – a synthesis

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Popular facies schemes of turbidite deposits presently in use are based on an idealized sequence of turbidite units, such as those erected by Bouma (1962) and Lowe (1982). We discuss here that such approach is flawed, because these idealized sequences do not reveal the spectrum of bedforms produced by supercritical turbidity currents (TCs) that are now found to be common on slopes steeper than 0.6 degrees, i.e. on slopes of deepwater deltas, in canyons, and in confinement of supra-lobe channels.

This paper shows and discusses how ‘problematic’ thick successions comprising structureless and crudely stratified deposits (top-cut out Bouma sequences) in conjunction with scours filled with backset stratification and Bouma Ta are specifically related to bedforms formed by high density super critical flows. It will also be shown that thick tabular and straight beds with Bouma Tb3-1, Tc, Tde, which are possibly linked with debrites (hybrid flows) and often traceable over long km distances (see Haughton et al. 2009 and Tjalling et al. 2012) can be related to high-density subcritical flows.

The ability to infer large-scale dynamics of turbidity currents from deposits allows rough estimates of slope on a basinal scale, and allows better differentiation and prediction of facies in sub-environments such as channel – lobe transitions, where supercritical confined flow transforms into subcritical flows. It will also aid modellers to better relate turbidite deposits with flow dynamics. The linking of turbidite units to large-scale flow dynamics resolves process-facies links that were hitherto unresolved in the Bouma sequence.

References:

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