Turbidite Facies Models; Integrating Subsurface and Outcrop

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Deep-water depositional environments are characterized by a vast array of facies. As a means of simplification of this inherent complexity, we characterize these settings in terms of depositional elements, each characterized by distinct facies. Four general depositional elements are recognized: channels, levees, fontal splays or lobes, and debris flow lobes, sheets, and channel fills.

Channels range from straight to meandering, and from deeply incised and minimally aggradational to minimally incised and highly aggradational. Amalgamated turbidite deposits dominated by Ta and Tb facies commonly characterize channel fills. Meander loops of moderate to high-sinuosity channels tend to expand as well as migrate down system through time.

Levee deposits tend to thin down system corresponding to a progressive loss of the fine-grained component from the turbidity flow because of continual spillover from channel onto overbank. Levee deposits tend to be thicker and sandier at outer channel bends with thin-bedded turbiditic sandstone beds commonly dominated by Ta, Tb, and Tc facies.

Frontal splays or lobes develop at gradient breaks or on basin floors where levee heights have decreased below a critical height. These features commonly are characterized by shallow (<3-5 m deep) distributary to braided channel networks. Frontal splay deposits are characterized by sheet-bedded sandstones dominated by Ta and Tb facies and can achieve thicknesses >100 m in some instances.

Debris flow deposits can take the form of sheets, lobes, and channel fills. Amalgamated debrites can achieve thicknesses >150 m. Debris flows can be highly erosive and characteristically overlie a heavily striated and grooved substrate. Debrites commonly are poorly sorted with no significant ordered fabric.