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Turbidite Sedimentation in Active-Margin Basins: Case Studies in the Influence of Syn-Depositional Deformation of the Sediment Surface on Turbidite Emplacement

Sedimentation in active margin basins clearly responds to external tectonic factors — only to be expected, given their tectonic setting and the frequency of major extrabasinal (allocyclic) events. However, deep marine clastic deposition in such basins is also influenced by sediment surface deformation, caused by a variety of intrabasinal influences. Studies from active margin basins provide insights which can be exported to passive margin settings.

The most important controls on turbidite dispersal is basin shape and the site of the sediment input point. Even large deltas (e.g. Colorado, Amur) are constrained by the size and shape of the basin, influencing the initial direction of turbidite sedimentation. The elongate form of active margin basins focuses sedimentation, preventing migration of sedimentary environments, hindering the development of ''autocycles'' and increasing the sensitivity of the system to tectonic events. Sedimentation from multiple sources shapes the detail of the sediment surface, deflecting axial turbidity currents and creating compensation cycles. Further modification comes from slumping, which creates sediment entry routes; slide blocks act as high points on the sea floor, further deflecting turbidity currents. Sediment remobilisation causes more surface deformation and focusing, both by withdrawal (negative topography) and injection/eruption (positive).

These points will be illustrated by examples from two forearcs (Alexander Island, Antarctica, and Sakhalin, Russia) and two back arc/marginal basins (South Georgia, South Atlantic, and the Gulf of California). Analogies will be made with elements of the oil bearing Paleocene-Eocene turbidite systems of the UK North Sea and West of Shetland.