AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

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Deposition from Sustained Sandy Suspension Clouds on Confined Basin Floors

Perched basins developed on continental slopes and uneven, structurally active basin floors are important as they may act as sumps locally trapping sand emplaced by contained or partly contained turbidity currents. Turbidity currents that flow into bathymetrically enclosed depressions produce a wide range of distinctive vertical bed profiles recording the operation of counter currents and/or 'sloshing' sediment suspensions, followed by settling of arrested muddy suspension clouds. To date, much of the evidence for flow containment has come from trapped surge-type, mixed sand-mud flows, but other combinations of sediment load and flow steadiness are likely to be important. The small size of many confined basins relative to the length and volume of the currents draining to them means the trapped suspension may be able to progressively inflate before collapsing. The ponded suspension may thus rise to some equilibrium level determined by the inbound current flux, downslope spillover (if important), and the rate of deposition. Thereafter, the suspension may be maintained as a 'nourished' suspension cloud, before progressively deflating, stranding earlier deposits on the flank of the bathymetric depression. This offers the possibility of recognising distinctive 'stranded' deposits on the elevated margins of confined basins which allow inferences about the prevailing bathymetry and sand distribution to be made. The results of laboratory experiments are reported for fully ponded suspensions fed by sustained particulate gravity currents, and the behaviour of the suspension clouds is related to the structure of contained turbidite sandstone beds using both outcrop and subsurface examples.