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Implications of Upper Cretaceous Nonmarine Sequence Architecture for Foreland-Basin Dynamics, Central and Southern Utah

Integrated studies of sandstone petrology, paleocurrent analysis, palynology and thrust belt growth strata yield insight into the relationship of non-marine stratigraphic sequences to foreland basin geodynamics. Three types of fluvial systems delivered detritus to the Albian-Campanian Cordilleran foreland basin in southern and central Utah: (1) ''Castlegate-type'' quartzose, transverse braided systems flowed east-southeast across a suppressed foredeep and blanketed the basin with sand-rich, low-accommodation deposits. They contain growth strata near all known updip thrust structures and graded downdip into terminal tidal-deltaic systems. (2) ''Straight Cliffs-type'' feldspatholithic, longitudinal, braided and meandering rivers flowed north along the foredeep, where their deposits are thickest. These systems terminated northward in major deltas and varied in their accommodation/sediment supply characteristics. They came from southern basement sources whose uplift history is not closely linked to thrust belt activity. (3) ''Hybrid-type'' quartzolithic braided and meandering rivers flowed northeast from the thrust belt to join type 2 rivers in the proximal foredeep. Type 1 rivers, deposited during rapid thrust front advance, traversed the basin via a thrust-supported, foreland-sloping ramp that reduced accommodation in the foredeep and created the high net to gross aspect of these deposits. Depositional architecture of type 2 systems resulted from subsidence-driven accommodation that slightly lagged peak thrust loading effects, with sediment flux modulated by climate. Superposed tectonic and climatic factors permitted long-distance delivery of unstable minerals. The extent of type 3 river deposits was controlled by how much detritus bypassed the wedgetop depozone. We regard eustasy as a minor factor in fluvial sequence architecture.