



AN EXPERIMENTAL STUDY AT BASIN SCALE OF VALLEY INCISION AND ASSOCIATED DEPOSITION DURING BASE-LEVEL FLUCTUATIONS

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How do valley incision and associated deposition in a sedimentary basin coevolve during base-level fluctuations? We present preliminary results from an experimental study of the stratigraphic effects of slow and rapid base-level cycles, in a fluvial deltaic system, given passive-margin style subsidence and constant conditions of sediment and water supply. The experiments were conducted in the Experimental Earthscape (XES) facility (Jurassic Tank), at St. Anthony Falls Laboratory, University of Minnesota. We observe that missing stratigraphy, or "condensed sections", can be found 1) in the upstream portions of the basin due to erosion, and 2) farther downstream due to delta lobe switching. We also find that in the more downstream portions of the basin, deposition occurred non-uniformly across the basin except during the slow base level fall, which produced a prograding sandy delta. All other base level drops involved sediment bypass on the fluvial plain with deposition focused near shoreline. Incised valleys that formed during the rapid cycles were narrow but widened downstream, due to increasing deposition rates downstream. The increase in deposition also causes synoptic relief to decrease downstream, though preserved stratigraphic depth increases downstream, as in traditional stratigraphic models.