Extension Rates Impact on Endorheic Drainage Longevity and Regional Sediment Discharge

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Tectonic and climate drivers exert co-equal forces on the evolution of tectonic sedimentary basins. The Rio Grande rift and its drainages provide a backdrop for discussing which drivers drive the transition from endorheic or closed drainage basins to exorheic or open, through-going drainage basins, with both climatic and tectonic drivers being proposed by researchers. With a dearth of regional scale extensional landscape modeling studies to draw from, we explore the impact of tectonic extension on endorheic-exorheic transitions and regional sediment and water discharge in both a “dry” and “wet” runoff regimes. We show that holding climate-induced runoff constant, that greater extensional rates correspond to a longer period of sedimentation capture, tectonically induced gradients significantly increases sedimentation long after tectonic activity has terminated, and that developing an endorheic basin is very difficult in high runoff regimes.

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