



Channel Structure and Hydrodynamics Where Freshwater Fluvial and Tidal Currents Meet

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There exists a detailed understanding of channel form and process in alluvial rivers with unidirectional flows, and a complimentary rich understanding of channels in estuaries with bidirectional flows. However, there is a dearth of information on the river segment, or transition zone, linking these flows. Additional insight is important because transition zone geomorphic structures may migrate with sea level change and serve as a real-time indicator of sea level rise. River stage, velocity and bathymetry in the Santee River were measured for four weeks. Here we show phase lag between currents and stage indicate that tidal energy convergence is likely balanced through higher energy dissipation from bottom friction. The net result is enhanced turbulence with strong control on spatial variability in sediment accumulation. In the case of the Santee River, with the sediment supply diminished by a dam and little apparent bank erosion, the interactions of tidal and fluvial hydrodynamic processes appear to delay its transition to a bedrock river.