

FANS AND POND SEDIMENTS RECORD CONCURRENT EPISODES OF HILLSLOPE EROSION

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In order to quantify the post-glacial behavior of hillslopes in the mountainous terrain of New England, we have investigated the stratigraphic record preserved in alluvial fans and lacustrine sediments. From these deposits, we infer the timing and magnitude of historic and pre-historic (Holocene) hillslope erosion.

A pair of well-dated, overlapping gyttja-rich sediment cores (5.75 m combined length) from the center of Ritterbush Pond in the Green Mountains includes five intervals dominated by sand and silt layers. On the basis of texture and stable carbon isotopic measurements, we interpret these inorganic layers as terrestrially-derived, episodic sedimentation events triggered by hillslope erosion in the steeply sloping, 2.2 km² watershed.

Trenching of five small (<2500 m²) alluvial fans demonstrates that these landforms preserve a detailed and datable record of deposition from which we have estimated aggradation rates and inferred changes in hillslope denudation over the past 8,000 ¹⁴C years. In every fan, a well-preserved paleosol is buried by 0.5 to 4 m of historic sediment indicating that colonial land clearance and agricultural practices increased hillslope erosion by up to an order of magnitude over background rates; such a dramatic increase in sedimentation during historic time is not present in the pond sediment cores.

Within the resolution of our 24 AMS ¹⁴C ages, periods of increased inorganic sediment deposition in the pond are coincident with periods of sediment deposition on the alluvial fans. Both archives appear to reflect climatic forcing of hillslope erosion during both the early (>6000 ¹⁴C y BP) and late (<2500 ¹⁴C y BP) Holocene. The middle Holocene appears to be a time of greater hillslope stability and lower sediment yield with less terrestrial sediment delivered to the pond and reduced rates of fan sedimentation.

alluvial fan, sedimentation-rate, erosion rate, human impact, event