Late Holocene Environmental Change at Cañada Alamosa, New Mexico, Based on Soil Stratigraphy and Carbon Isotopes

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Astride the Rio Alamosa in south-central New Mexico is a stepped sequence of geomorphic surfaces that have developed in response to a changing flood plain base level. The topographically lowest and youngest surfaces have soils containing charcoal deposits that span a period from 3180 to 160 yr BP. These dates and soil stratigraphy indicate the Rio Alamosa flood plain and the alluvial fans grading to the flood plain aggraded until ca. 3000 BP when a sedimentation hiatus occurred. This permitted the formation of a prominent “A” horizon across the land surface of the alluvial fans. The land surface at that time, based on C isotopes, was occupied by dense grassland. The grass cover declined and alluviation recommenced around 2460 BP (during Antevs’ “Fairbanks Drought”) causing the landscape to aggrade until a second break in alluviation occurred at ca. 1900 yr BP. After this hiatus, alluviation started again, forming the third and uppermost deposit which correlates to the Medieval Warm Period (ca. AD 900-1300). This third unit, named Alamosa III, and the underlying units (Alamosa II and I) were incised by the arroyo network attached to the Rio Alamosa indicating a drop in base level. Backhoe trenches in the valley floor revealed buried “A” horizons 1 to 1.5 meters deep that contained charcoal dated at 550 and 350 yr BP. These buried land surfaces in the valley floor provide evidence that stream incision occurred during the Little Ice Age (ca. 1500-1850 AD) when erosion on the surrounding hillslopes was less active and the capacity for removing sediment from the valley floor by the Rio Alamosa was greater, thus dropping the base level. Since the end of the Little Ice Age erosion and sedimentation are again high as indicated alluvial fans building onto the modern floodplain and the landscape is once again aggrading.

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