



Human induced prehistoric and historical soil erosion and landscape development in Southwestern USA

Markus Dotterweich (1), Andrew H. Ivester (2), Paul R. Hanson (3), Larsen Daniel (4), David H. Dye (5), and Thomas H. Foster II (6)

(1) GEOarch -Applied Geoarchaeology-, Paul-Münch-Str. 3, 76829 Landau, Germany, md@geoarch.de, (2) Geosciences, University of West Georgia, 1601 Maple Street, Carrollton, GA 30118, USA, aivester@westga.edu, (3) School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE 68583, USA, phanson2@unl.edu, (4) Department of Earth Sciences, The University of Memphis, Memphis, TN 38152, dlarsen@memphis.edu, (5) Department of Earth Sciences, The University of Memphis, Memphis, TN 38152, daviddye@memphis.edu, (6) Department of Anthropology, The University of Tulsa, Henry Kendall College of Arts and Sciences, Tulsa, OK 74104, USA, thomas-foster@utulsa.edu

The significance of soil erosion due to pre-historic land use and possible feedback mechanisms had been hardly recognized in the Southeastern USA. Here, the agricultural practices only began in the second half of the Holocene. Sedentary hunters and gatherers started to domesticate squash and sunflowers. Associated with the expansion of maize cultivation in the Mississippian period between AD 800 and 1100, significant forest clearings took place on the river floodplains. During this time, central settlements with up to 30,000 residences existed and the surrounding ridge and furrow fields extended to up to 30 ha. It is still open to question why these groups already declined in the 14/15th centuries already before the arrival of the Europeans. However, around AD 1540 the conquistador de Soto still reports extended fields with intensive cultivation of maize in the uplands of Northern Mississippi. Despite of this intensive land use by Native Americans, current research gives no indication that these activities had any significant impact on river channel form. Also, no clear evidence exists for distinct channel change occurring in response to any sort of middle Holocene Hypsithermal, Medieval warm period, or the Little Ice Age. We will present results of a project which aims to explore erosion forms, colluvial sediments and buried soils in selected 0-order and 1st-order watersheds in the southeastern USA in order to gain, solidify, and evaluate general data on soil erosion during the Native American land use period and its respective long-term effects on the environment. This will be achieved by 1) recording the stratigraphy of colluvial and alluvial sediments and buried soils, 2) mapping the extent of erosional and colluvial forms, 3) analyzing chemical and physical soil and sediment properties, 4) establishing chronological control using various dating techniques including radiocarbon and OSL dating, and 5) quantifying soil erosion using hillslope sediments. The gathered data will be used to i) compare the spatial extent of prehistoric and historic erosion and the short-term and long-term pedological and geomorphological effects of subtle soil erosion against extreme events, ii) assess the feedback-mechanisms of soil erosion on soil fertility and measurable land use changes in prehistorical and historical times, and (iii) estimate the long term effects of soil erosion and sediment deposition on archaeological features. The outcome will provide a decisive step forward to gather new qualitative and quantitative information on soil erosion during the Native American land use period to be able to achieve a better understanding of the long-term human induced landscape evolution in the uplands of the Southeastern USA and deliver data for a better predicting of landscape evolution to future climatic shifts in precipitation regimes.