

Pedofeatures from a Modern Soil Chronosequence, a Technique for Estimating the Relative Age of Ancient Pedogenic Features

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ABSTRACT

Blue light optically stimulated luminescence (OSL) dates obtained from upland and terrace domains in southeastern Mississippi have been used to generate a model for illuvial clay accumulation in deeply weathered, subtropical soils (*e.g.*, ultisols). The illuvial clays developed in upland versus alluvial terrace soils of southeastern Mississippi are distinct in terms of thickness and total volume of translocated clay.

The coatings in the Mississippi soils are also an analogue for pedofeatures observed in mid-Cretaceous paleosols of North America. Many of the Cretaceous paleosols had a polygenetic history. The relative age of the well-drained phase of pedogenic development, characterized by illuvial clay accumulations, may be estimated using the model generated from the Mississippi soils. As many of the mid-Cretaceous paleosols mark unconformities, it would be beneficial to estimate the duration of the diastems.

Three geomorphic domains characterize the landscape of southeastern Mississippi: uplands, stream-cut terraces, and modern alluvium. The factors affecting soil development have been similar in all three domains with the exception of time. The uplands have been exposed to pedogenic processes for more than 100,000 yrs, while the terraces are Pleistocene in age (18-23 ka, based upon OSL dates). The present floodplain, has poorly developed soils, and lacks illuvial accumulations. Soils developing in the uplands have prominent illuvial clay coatings up to 1/16 in. thick, while the terraces have minor clay coatings less than 1/32 in. thick and are of different hardness and color. The parent materials consist of the Miocene Hattiesburg Formation and the overlying Plio-Pleistocene (?) Citronelle Formation.