

PALEOENVIRONMENTAL AND PALEOCLIMATIC RECONSTRUCTION USING PALEOSOLS FROM THE CRETACEOUS OF TEXAS

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ABSTRACT

Paleosols occur throughout the Cretaceous terrestrial formations of Texas and can provide important quantitative information regarding paleoenvironment and paleoclimate. The goal of this project is to estimate paleoatmospheric CO₂ concentrations, paleotemperature, and mean annual precipitation by analyzing carbon stable isotopes of paleosol carbonates, oxygen and hydrogen isotopes of pedogenic phyllosilicates, and conducting X-ray fluorescence analysis of paleosol sediment to understand paleoclimate and paleoenvironmental change through the terrestrial Cretaceous formations of Texas. Paleosols and vertebrate fossils are documented in the Aptian (late Early Cretaceous) Twin Mountains Formation and throughout the Campanian and Maastrichtian (latest Cretaceous) Aguja, Javelina, and Black Peaks formations of Big Bend National Park. Thus, an evaluation of paleosols will provide local paleoenvironmental context for Early and Late Cretaceous vertebrates based on paleosol characteristics. Stable isotopic values produced from paleosol carbonates and phyllosilicates will provide isotopic pCO₂ and paleotemperature estimates for the Early and Late Cretaceous of south central North America at 120 Ma and 66 Ma during which major faunal and flora changes occurred. These results will provide essential data needed to understand the relationship between relatively high CO₂ concentrations and climate response throughout the Cretaceous of Texas. This is of particular interest as our modern atmospheric CO₂ concentrations continue to rise along with global temperature.

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