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Paleosol-based paleoclimate reconstruction of the Paleocene Eocene Thermal Maximum, northern Argentina

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ABSTRACT

The Paleocene-Eocene Thermal Maximum (PETM) is a well-documented, relatively short-lived, warm episode in Earth history. Previous studies completed on marine and continental strata spanning the PETM have focused on understanding the magnitude of warming and other atmospheric changes. These studies, completed largely in the Northern Hemisphere, report warming that ranged from 4-8°C above mean annual paleotemperatures prior to warming.

In this study, paleosols in the Salta Basin, northern Argentina, are used to reconstruct paleoprecipitation rates and mean annual paleotemperatures of the Southern Hemisphere from before, during and after the PETM. Carbon isotope data are used to: 1) identify the horizon in which the PETM and other Eocene hyperthermals are recorded; and, 2) to interpret perturbations of the global carbon cycle during the PETM. At the height of the PETM, paleoprecipitation proxies indicate ~1500 mm of annual rainfall and a temperature increase of ~5°C from pre-PETM values. Carbon isotope data records three negative carbon isotope excursions during the PETM in this region, suggesting the possibility of three distinct, rapid releases of isotopically depleted carbon into the ocean-atmosphere system. The results presented here are one of only a few paleoclimate reconstructions from continental sediments spanning the PETM in the Southern Hemisphere.

KEYWORDS

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