

Geochemical Signature of Hydrologic Intensification during the PETM

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In response to greenhouse warming, the hydrological cycle is anticipated to intensify, as higher temperatures lead to higher rates of evaporation and the atmosphere's holding capacity increases. However, there is a good deal of variability both spatially and in the manner in which this intensification may manifest itself. The Salisbury Embayment along the Mid-Atlantic Coast of the United States can serve as a case study into how the hydrologic cycle has responded to past rapid warming events, specifically the Paleocene-Eocene Thermal Maximum (PETM). At the onset of the PETM, the sediments of the Salisbury Embayment demonstrate a marked increase in kaolinite, a mineral typically associated with wetter conditions and enhanced chemical weathering. However, the origin of this kaolinite pulse is debated [1, 2].

Using data from Howard's Tract and South Dover Bridge cores, this study seeks to identify the source of these sediments by coupling semi-quantitative X-ray diffraction analysis of clay mineralogy to the trace metal isotope composition, namely lithium, strontium, and lead. Preliminary results show a shift in the strontium and lead isotopes of the siliciclastic fraction of sediment that is coeval to an increase in the kaolinite content, suggesting a change in sediment source during the carbon isotope excursion associated with the PETM. Lithium isotopes obtained from the clay sized fraction suggest a shift to a more physically erosive state with a reduction in chemical weathering, further supporting the hypothesis of a reworking of previous units rather than authigenic formation of kaolinite during the PETM.

Previous work has suggested the Cretaceous-age Raritan formation as the source of the reworked kaolinite. This study seeks to test this hypothesis, by analyzing the lead and strontium isotopes of the siliciclastic fraction of the Raritan as a potential endmember.

[1] Gibson, Bybell, & Mason (2000), *Sedimentary Geology* 134, 65-92. [2] John, Banerjee, Longstaffe, Sica, Law, & Zachos (2012), *Geology* 40, 591-594.