TRENDS IN pCO_2, HYDROLOGIC PROXIES, AND CONIFER PHYSIOGNOMICS ACROSS THE END-TRIASSIC EXTINCTION TRACK THE VARYING CLIMATIC IMPACT OF CAMP VOLCANISM

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Extreme warming and cooling related to the voluminous eruptions of the Central Atlantic Magmatic Province (CAMP) 201.6 Ma share the stage as the main drivers of the end-Triassic extinction (ETE). The ETE had minimal effects on land plant diversity; however, we observed significant effects in plant physiognomy that parallel orbital-to-seasonal-scale pCO_2 and hydrological variations recorded from the same strata. We describe trends in cheirolepidaceous conifer leaf and stomatal morphology from deposits within orbitally paced, tropical Pangean great rift lakes (present northeastern USA) that appear at an abrupt (<10 ky) negative $\delta^{13}C$ excursion recorded in *n*-alkanes from leaf wax lipids. This signal is synchronous with a palynological turnover and a spike in fern abundance and continues through a prolonged negative $\delta^{13}C$ excursion. This event tracks an enhanced hydrological cycle with repeated sudden shifts in relative evaporation revealed in hydrogen isotope data captured in *n*-alkanes and a pCO_2 record from soil pedogenic carbonates and phytane, a biomarker linked to the degradation of chlorophyll. The protracted excursion lasts 900 ky (through all three basaltic extrusive events of the CAMP), encompassing most of the Hettangian age.

Superimposed on these long-term trends is an abundance of the possibly frost-tolerant fern *Clathropteris* at the ETE, which continues through the first pulse of CAMP activity, consistent with volcanic winters from sulfur degassing and repeated transient drops in temperature. Strata just above the two oldest pulses are also associated with unusual limestone deposits that suggest extremely elevated pCO_2 and concomitant weathering of exposed recent CAMP lavas.

The alterations in plant physiology, e.g., the development of smaller leaves with thicker cuticles and sunken stomata, occurred during intervals of elevated pCO_2 from CAMP emissions. Subsequently, a two- to five-fold increase in the area of leafy shoots in strata of latest Hettangian age suggests lower evaporation under lower Jurassic pCO_2 (via CAMP weathering) despite Pangea's drift into the arid belt. The changes in floral physiognomy associated with the negative $\delta^{13}C$ excursion, very elevated pCO_2 levels, and abrupt transitions in arid and humid conditions are a microcosm of the Mesozoic in which the dominance of cheiroleps overlaps with the highest pCO_2 levels of the Phanerozoic.