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The Carnian-Norian of the Paleo-Antarctic Circle (Tasmania): Understanding the environmental changes through multi-proxy analysis.

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The Late Triassic Carnian–Norian era marked a significant period of global climatic changes, often associated with a shift from arid to more humid conditions, initiated by the Carnian Pluvial Episode (CPE). This transition towards a more humid climate during the CPE is frequently attributed to the emplacement of the Wrangellia Large Igneous Province, ~233 million years ago in northern Panthalassa. In this study, we present new geochemical proxy data, including organic carbon isotopes, biomarkers, elemental data, and Scanning Electron Microscopy (SEM) imagery of charred plant residues, from two cores in Eastern Tasmania. These cores represent Carnian age fluvial-lacustrine deposits of the Upper Parmeener Supergroup and provide a distinctive opportunity to investigate the repercussions of this significant climatic shift at high latitudes within the paleo-Antarctic circle.

Sediment samples from the BIC3A and BIC5 cores were processed and analyzed using gas chromatography / mass spectrometry to identify *n*-alkanes and polycyclic aromatic hydrocarbons (PAHs). Initial findings from this study indicate a notable escalation in soil erosion during sediment deposition, evidenced by elevated concentrations of dibenzofuran and dibenzothiophene. An increase in retene concentrations as well as elemental data including increased smectite also supports enhanced terrestrial inputs, likely related to the intensification of the hydrological cycle during the Carnian. Inertinite coalbeds are observed at the base of the CPE onset, which signifies subaerial accumulation of peat on floodplains. Concentrations of total PAHs encompassing 3 to 7 rings, typically associated with biomass burning, indicate a probable intensification of wildfire activity, potentially influenced by a transition towards more humid conditions with increased terrestrial productivity interrupting hotter and more aridity conditions, creating a catalyst for enhanced wildfire activity. A comparative analysis of PAHs with higher-molecular-weight (5- to 7-ring) PAHs and lower-molecular-weights (3-ring) PAHs reveals a higher burning intensity and temperature towards the upper part of one of the cores. Fossilized charred wood was imaged, and provides evidence of distorted plant tissues, biseriate pits and homogenized cell walls indicative of high temperature fires between 300°C to 325°C. This study offers a unique record of the impact of an extreme climatic episode in the Southern Hemisphere.