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Low-latitude non-explosive volcanic eruptions during the end-Triassic mass extinction

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Emplacement of the Central Atlantic Magmatic Province (CAMP) is thought to have triggered the end-Triassic mass extinction. However, neither the exact climatic effects of volcanism nor the kill mechanisms have been clarified until now. Our new study shows that marine strata exposed at the GSSP section Kuhjoch in Austria preserve elevated ratios of Hg to total organic carbon and high concentrations of five- to six-ring polycyclic aromatic hydrocarbons (PAHs). The increase in the tracer begins at the mass extinction horizon and extends to the lowest Jurassic, indicating volcanic activity and formation of soot, respectively. The relative abundance of coronene to other PAHs provides a proxy for combustion temperature. Soot at the mass extinction horizon was derived from low temperature combustion, consistent with wildfires. Only, soot deposited during subsequent volcanism was sourced from higher temperature combustion associated with explosive volcanism. Our new dataset is best explained by initial release of soot and SO_2 gas from low latitude CAMP volcanism into the upper troposphere, where the dark soot was heated by solar radiation, catalyzing formation of stratospheric sulfate and soot aerosols, leading to global cooling and drought, which induced the mass extinction.