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Atmospheric methane injection caused end-Triassic mass extinction

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The end-Triassic mass extinction (∼201.5 Ma), marked by major terrestrial ecosystem changes and a 50% loss in marine biodiversity, coincides with a distinct negative perturbation in marine C-isotope records. These events have been attributed to the onset of intensified volcanic activity in the Central Atlantic Magmatic Province (CAMP), the largest igneous province on earth. However, global carbon cycle disruption has been questioned due to varying magnitudes of the observed negative excursion between different sedimentary basins.
Here, we present compound specific C-isotope data of long-chain n-alkanes derived from waxes of land plants, showing a ∼8.5%■ negative excursion coincident with the extinction interval. These data suggest strong 13C depletion of the end-Triassic atmosphere, within 10-20 kyr. The magnitude and rate of C-cycle disruption can only be explained by the injection of ∼12x103 Gt of isotopically depleted carbon from the methane-hydrate reservoir. Concurrent vegetation changes reflect strong warming and an enhanced hydrological cycle. Hence the end-Triassic extinction is, for the first time, mechanistically linked to massive carbon release and associated climate change.