Geophysical Research Abstracts
Vol. 18, EGU2016-6899, 2016
EGU General Assembly 2016

The Carnian (Late Triassic) carbon isotope excursion: new insights from the terrestrial realm

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The geological record contains evidence for numerous pronounced perturbations in the global carbon cycle, some of which are associated with eruptions from large igneous provinces (LIP), and consequently, ocean acidification and mass extinction. In the Carnian (Late Triassic), evidence from sedimentology and fossil pollen points to a significant change in climate, resulting in biotic turnover: during a period termed the 'Carnian Pluvial Event' (CPE). Additionally, during the Carnian, large volumes of flood basalts were erupted from the Wrangellia LIP (western North America). Evidence from the marine realm suggests a fundamental relationship between the CPE, a global 'wet' period, and the injection of light carbon into the atmosphere from the LIP. Here we provide the first evidence from the terrestrial realm of a significant negative δ13C excursion through the CPE recorded in the sedimentary archive of the Wiscombe Park Borehole, Devon (UK). Both total organic matter and plant leaf waxes reflect a gradual carbon isotope excursion of $\sim -5‰$ during this time interval. Our data provides evidence for the global nature of this isotope excursion, supporting the hypothesis that the excursion was likely the result of an injection of light carbon into the atmosphere from the Wrangellia LIP.