



Orbitally paced carbon and deep-sea temperature changes at the peak of the Early Eocene Climatic Optimum

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The early Eocene was characterized by major perturbations in the global carbon cycle and fluctuations in global temperatures on both short and long- time scales. As such, it represents an ideal case study to analyse the impact of increase global warming on the ocean-atmosphere system. During this time interval, the Earth's surface experienced a long-term warming trend that culminated in a period of sustained high temperatures called the Early Eocene Climatic Optimum (EECO). A series of transient global warming events occurred superimposed on the late Paleocene- early Eocene long-term warming trend and persisted throughout the peak warming. These “hyperthermal” events were associated with dramatic increase in temperature and perturbations in the carbon cycle, driven by the release of large amounts of isotopically light carbon into the ocean-atmosphere system, possibly triggered by a common orbital forcing mechanism. Unravelling this complex climatic system strictly depends on the availability of high-quality suitable geological records and accurate age models. Here, we present astronomically tuned high-resolution benthic stable isotope records from ODP Site 1263, (Walvis Ridge, SE Atlantic) between ~54 and 49 Ma, confirming the presence of several short-term warming events during the peak and termination of the EECO. We discuss the changes associated with these events on short- and long- term time scales, in relation to orbital forcing. Moreover, we compare our records to coeval records from other locations to establish global correlations across this critical time interval.