

A constraint on the cause of the Paleocene-Eocene thermal maximum from a global carbon cycle modeling

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One of the most dramatic global warming events in Earth's history occurred at the Paleocene-Eocene boundary (PEB; ca. 55 Ma). During the Paleocene-Eocene thermal maximum (PETM), the global temperature increased by more than 4°C within a few thousand years (e.g. Zachos et al., 2001), and simultaneously an abrupt negative carbon isotope excursion (CIE) occurred both in marine and terrestrial environments (e.g. Kennett and Stott, 1991; Koch et al., 1992). Although the CIE implies a massive and rapid release of ¹³C-depleted carbon to the oceans and atmosphere, the source of the massive carbon injection across the PEB remains uncertain (Zachos et al., 2008). In order to provide some constraints on the cause of the PETM, we reconstruct the perturbation of global carbon cycle across the PEB with a simple 2-box global carbon cycle modeling.

Keywords: global warming, Paleocene-Eocene thermal maximum, global carbon cycle modeling, carbon isotope, methane hydrate, thermogenic methane