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High resolution deep-sea stable isotopes: do Early Eocene hyperthermals share a common origin?

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During the Early Eocene, the Earth experienced a prolonged warming trend (55-50 Ma), punctuated by a series of short-lived global warming events known as “hyperthermals”, of which the Paleocene-Eocene Thermal Maximum, (PETM) is the most extreme, followed by the ETM2 (Elmo) and the ETM3 (“X-event”). Along with these events, a number of less pronounced negative carbon isotope excursions, termed A to L by Cramer et al (2003), occurred throughout the Paleogene up to the Early Eocene Climatic Optimum (EECO). The drastic increase in temperature during the hyperthermals is associated with the release of large amounts of isotopically light carbon into the ocean-atmosphere system. Several hypotheses have been proposed to determine the sources and mechanisms of these carbon inputs, in particular the dissociation of marine gas hydrates. However, what still remains unclear is whether or not these events share a common source. To address this question we compare the quantitative relationship between high-resolution carbon and oxygen stable isotope records from benthic foraminiferal tests. A similar correspondence between changes in the carbon cycle and global temperature among the events, regardless of their magnitudes, would imply a similarity in their origins. Following Stap et al. 2010, we present the results of the comparison between our data and previously published data, using deep-sea material to extend the record to the I1-I2 events.