Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02445, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02445
EGU General Assembly 2008

Reconstruction of ocean temperature and carbonate dissolution during ETM-2 (∼53.7 Ma)

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The occurrence of Paleogene hyperthermal events are generally attributed to the rapid release of large amounts of isotopically light carbon into the ocean-atmosphere system as indicated by major negative excursion in the δ^{13}C (CIE) of planktic and benthic foraminifera as well as land records. Moreover bathyal sediments are characterized by severe carbonate dissolution. Possible sources of the massive carbon release are the oxidation of methane hydrates, burning of peat or oxidation of organic matter after desiccation of inland seas. With the discovery of Eocene Thermal Maximum 2 (ETM-2; often referred to as Elmo or H1), evidence was gained that the Palaeocene Eocene Thermal Maximum (PETM) was not unique, although the carbon release and inferred global temperature rise during ETM-2 appeared to be only half that of the PETM. At present, ETM-2 has not been studied in great detail and not much is known about its duration, carbonate dissolution and temperature throughout the water column. Here, we will present high-resolution carbon and oxygen isotope of bulk, multiple benthic and single planktonic foraminifera across ETM-2 and the succeeding, but lesser in magnitude, hyperthermal (referred to as H2) along the Leg 208 depth transect (Walvis Ridge). We will show that during ETM-2 there is a two step gradual decrease recorded in the bulk carbon isotope record of $1‰$ in total and a warming of 3˚C in the surface ocean as shown by a $0.7‰$ decrease in the oxygen isotopes. Strikingly, the depth-transect reveals that during ETM-2 a reversed δ^{18}O gradient prevailed in the bulk

isotopes, suggesting the selective dissolution of nannofossil taxa.