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Calcareous nannoplankton productivity response to the Early Eocene Hyperthermal Event (ETM2) Elmo

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Field and experimental studies have shown that the Sr/Ca ratio in coccolith calcite is related to the productivity of calcareous nannoplankton. Using a technique that enables obtaining and measuring the Sr/Ca ratios in monogeneric samples, we have generated a record of the productivity response of different calcareous nannoplankton genera to the Elmo event (ETM2), an early Eocene hyperthermal event about half the magnitude of the PETM. Nannofossils were isolated from ODP site 1265A, located at the Walvis Ridge, South Atlantic.

The Sr/Ca ratios in five different genera were analysed. *Coccolithus pelagicus,* a species that is considered to prefer warmer surface waters,shows an increase in Sr/Ca ratios a few cm below the first isotopically light bulk carbonate carbon isotope values in the excursion of the Elmo event. Coincident with the carbon isotopic excursion, Sr/Ca ratios of *Toweius* increase significantly. The genus *Toweius* is regarded to have a preference for more eutrophic conditions. No change in Sr/Ca ratios is observed in the cold water taxon *Chiasmolithus* during the Elmo event. Discoasters were found to be severely overgrown, thereby restricting Sr/Ca measurements to individual specimens of Discoaster. Analysis of the Sr/Ca ratios in the primary core of individual Discoasters was possible by ablating through the overgrowth. The Sr/Ca ratios in the primary core of two Discoasters from the Elmo event is higher than core Sr/Ca ratios in an individual that precedes the event or in an individual that postdates the event. The productivity response shown by the Sr/Ca ratios in *C. pelagicus* and *Toweius* may

indicate more eutrophic conditions that further enhance the primary productivity at the site during the Elmo. The response in *C. pelagicus* is coincident with an initial warming signal found in the O-isotope signal that is measured in size fractions dominated by the pelagic nannofossil carbonate of *C. pelagicus* and *Toweius*. The inference of higher productivity contrasts with relative abundance shifts in nannofossils which are interpreted as reflecting more oligotrophic conditions. However, absolute abundances show that the climatic signal reconstructed with relative abundances is affected by dissolution, resulting in a significant increase in relative abundance of the dissolution-resistant oligotrophic Discoaster.