Geophysical Research Abstracts
Vol. 12, EGU2010-8805-1, 2010
EGU General Assembly 2010

Restructuring of benthic foraminiferal communities at the Paleocene-Eocene Thermal Maximum: the Forada record (NE Italy)

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A continuous and expanded marine sedimentary section across the Paleocene/Eocene boundary interval is exposed at Forada (northeastern Italy). Recent studies (Giusberti et al., 2007, Agnini et al., 2007, Luciani et al., 2007) document that this section contains a high-quality record of the so-called Paleocene-Eocene Thermal Maximum (PETM). This brief episode of extreme warmth, occurred at about 55 Ma, has attracted large consideration by the scientific community as recording one of the most dramatic and sudden global temperature increase of the entire Cenozoic. The PETM is globally recognizable in both terrestrial and marine setting by the about 2–3‰ negative carbon isotope excursion (CIE), resulting by a massive, rapid input of light carbon to the ocean–atmosphere system. At the base of the CIE a major acidification event occurred in the oceans, as consequence of a rapid and marked shallowing (on the order of 2 km) of the calcite compensation depth (CCD; Zachos et al., 2005). Among the profound biotic modifications that typify the PETM event, the extinction of bathyal and abyssal benthic foraminifera (Benthic Extinction Event; BEE) is the most dramatic event in the in deep-sea of the entire Cenozoic. Although a relatively high data set has been generated from the analysis of several ODP and on-land successions, the mechanism by which global warming would have caused the benthic extinction is not clear and several aspects of this crucial event are still elusive (Thomas, 2007). The major difficulty in the study of the extinction and recovery pattern of benthic foraminifera is represented by the fact that the extinction level often coincides with an unconformity and/or with carbonate-dissolution intervals with poor or not recovery of calcareous foraminifera. The Tethys region does not make an exception and the benthic foraminiferal record of basalmost CIE in most cases is poor or too condensed (e.g. Ortiz, 1995; Ernst et al., 2006; Alegret et al., 2009; Giusberti et al., 2009). On the contrary, the PETM interval in the Forada section, deposited at a middle-lower bathyal depth, is characterized by a continuous and expanded carbonate record, and a cyclostratigraphy inferred from precessional cyclicity. Probably because of the relatively shallow depositional depth above the CCD, dissolution was less severe than elsewhere in the Tethys and calcareous benthic foraminifera are present for most of the entire thickness of the CIE ($>$ 4 m thick). The Forada section is thus well suited to explore in detail the benthic foraminiferal response to the environmental perturbations occurring during a major portion of the PETM. The assemblages of the studied interval at Forada differ from those of any other bathyal Tethyan sections for the strong dominance of bolivinids that usually are abundant in the eutrophic continental margins. Remarkably, our high resolution data show that benthic foraminiferal communities become increasingly perturbed just above a -1‰ shift of δ^{13}C, ca. 10 kyr before the -2,35‰ shift marking the base of the CIE. In correspondence of the basalmost CIE the BEE horizon is recorded, and a thin interval (10 cm-thick, ca. 5 kyr) dominated by agglutinated forms (e.g. pseudobolivinids, *Haplophragmoides* and *Karrerulina*) is followed by peculiar peaks of dwarfed calcareous forms (e.g. *Tappanina selmensis, Globocassidulina subglobosa*) that clearly indicate community repopulation and reorganization in the extremely stressed post extinction interval (disaster taxa dominance). A first important step in the recovery of benthic foraminifera is recorded ca. 30 kyr after the onset of the CIE, where bolivinids massively reappear. Within the rest of the CIE interval sea floor conditions gradually ameliorated under a general context of perturbation under high food transfer, as consequence of the enhanced eutrophication of surface waters (Agnini et al., 2007; Luciani et al., 2007). A second dissolution interval was observed just below the CIE recovery interval and is characterized by increased fragmentation of planktonic foraminiferal tests, decreased calcite content together with a general deterioration of benthic foraminiferal preservation. Such interval may indicate a second, less pronounced rise of the CCD ca. 90 kyr after the onset of the CIE.

Similar intervals have been so far recognized in two other Tethyan sections (Caravaca and Contessa) and deserve further investigations. The succession of events and changes in the taxonomic structure of benthic foraminifera recognized at Forada can be useful for a high-resolution supraregional stratigraphic correlation within the crucial PETM interval.

Agnini et al., 2007. Mar. Micropal., 63, 19-38.

Alegret et al., 2009. Palaeogeogr., Palaeoclimatol., Palaeoecol., 279, 186-200.

Ernst et al., 2006. Mar. Micropal., 60, 89-111.

Giusberti et al., 2007. GSA Bull., 119, 391-412.

Giusberti et al., 2009. Mar Micropal., 70, 102-119.

Luciani et al., 2007. Mar Micropal., 64, 189-214.

Ortiz, 1995. Mar. Micropal., 26, 341-359.

Thomas, 2007. GSA Spec. Pap., 424, 1-23.

Zachos et al., 2005. Science, 308, 1611-1615.