



Global extinction of intermediate-thermocline planktic foraminifera at the mid Maastrichtian warm event.

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The Cretaceous greenhouse climatic mode terminated with a gradual trend of global cooling from the late Campanian (~73 Ma) until nearly the end the Maastrichtian. Onset of cooling coincided with highest morphological and taxonomic diversity of Cretaceous planktic foraminifera. High diversity populations of planktonics are attributed to intensification of upper water mass stratification and the development of new potential habitats. However, recent evidence indicates that the late Cretaceous cooling trend was interrupted by two episodes of greenhouse warming. The earlier lasted between about 70 to 68 Ma (e.g. the mid-Maastrichtian event), while the second commenced 450 ky before the K-T boundary and lasted only 300 ky. We here show data from the Negev, Israel, regarding the earlier event, that planktic foraminiferal faunas respond to warming perturbations of the global cooling trend by opportunist blooming, and by extinctions, which are global.

Several sections of the Maastrichtian in the Zin Valley of the Negev, Israel were studied at high resolution. Upper bathyal depths are indicated by presence of intermediate-water species. The section was successfully zoned according to the CF - subzonation of Li and Keller (1998). Around Zone CF7 (70.4-69.6 Ma) occurs a substantial *Guembelitra* bloom (45%) followed from within Zone CF7 through CF 5 (to 68.3 Ma) by gradual extinction of *Contusotruncana fornicata*, *C. plummerae*, *Globotruncana bulloides*, *G. ventricosa*, *G. linneiana*, together with decline of *G. arca*, *Archaeoglobigerina blowi* and *A. cretacea*. Despite subsequent return to cooling, globotruncanid diversity does not recover, although there is a bloom of *Gansserina gansseri*.

A warm event estimated at up to 6 degrees began in Zone CF7, well documented in the Atlantic and the Shatsky Rise in the Pacific. In the Negev, the CF7 *Guembelitra* bloom is coeval with initiation of this warming, and is followed by gradual extinctions

of intermediate-water species that were previously common. The extinctions of this interval have been recorded to date also from the South Atlantic (extinction event no. 3), Madagascar, North Africa and equatorial Pacific. Constraint of these extinctions to this interval indicates that this warming was global, and indicates reduction of habitat partitioning around the thermocline. The *Gansserina* bloom during the recovery from this thermal perturbation is also found in localities besides the Negev indicating that the stress caused by warming was a climatic event global in nature. The thermally-driven planktic foraminiferal extinction of the mid-Maastrichtian coincided with other extinctions, e.g., inoceramids, indicating that periodic global thermal stress was a contributory factor to the Maastrichtian declines leading up to K-T boundary.