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Planktic foraminiferal response to the Latest Danian Event in the Pacific Ocean (ODP Site 1210)

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During the Paleocene the marine ecosystem was disturbed by several transient climate events, e.g. the Dan-C2 (65.2 Ma), the Latest Danian Event (LDE, 61.75 Ma), and most known, the Paleocene-Eocene Thermal Maximum (PETM, 56 Ma). So far the LDE (or "Top Chron 27n Event") has rarely been studied in deep-sea sites with respect to the evolution and the paleoecology of planktic foraminifera. The event has already been described from Zumaia/Spain, Bjala/Bulgaria, Egypt, Shatsky Rise and Walvis Ridge. In the deep-sea the LDE is usually characterized by two distinctive Fe peaks in XRF core scanning data, paralleled by a prominent ($\sim$0.7 ‰ negative δ13C excursion (CIE) in benthic foraminifera (Westerhold et al., 2008, 2011). Benthic foraminiferal δ18O data from nearby ODP Site 1209 suggest a bottom-water temperature rise of $\sim$2°C accompanying the negative CIE. Thus, the LDE has been considered as a further potential Paleocene "hyperthermal".
Here we present data from ODP Site 1210 of the biotic response (planktic foraminifera assemblages), carbonate preservation as well as δ18O and δ13C isotope signals of the surface, subsurface and benthic taxa covering a time span of about 900 kyr around the LDE. Among others, it is mainly investigated to what extent the LDE influences the ocean ecology and especially the surface waters.
Trends of both δ18O and δ13C of planktic and benthic foraminifera show negative shifts at the onset of the LDE. A 0.6‰ drop within 100 ky in planktic δ18O data suggest a temperature rise of $\sim$2.5°C, whereas benthic foraminifera bottom water temperatures confirm a $\sim$2°C rise like measured at Site 1209. δ13C variation is more abrupt and pronounced than the δ18O shift at the base of the LDE. The decreasing δ13C gradient between surface and subsurface dwelling foraminifera suggests a weaker and or shallower thermocline. Thermocline dwelling asymbiotic Parasubbotina rise in abundance simultaneously to the decrease in the δ13C gradient which may suggest that this taxon benefits from a shallower thermocline and, thus, increased stratification. After the event, photosymbiotic activity in surface dwellers like Morozovella might have been boosted due to less competitive pressure. Minor dissolution according to planktic foraminiferal fragmentation, P/B-ratios and coarse fraction is considered to be present during the LDE. This observation is consistent with a decrease in the total $CaCO_3$ record, which drops from $\sim$95% to 85%, while planktic foraminifera suffer a strong decrease in abundance from $\sim$20,000 to $\sim$1,000 speciemn per gram during the event. Results from Non-metric Multidimentional Scaling suggest distinct faunal changes between before, during and after the LDE. Prominent changes are especially the disappearance of Praemurica spp. shortly before or with the onset of the event, whereas Igorina albeari increases from 'few' to 'abundant' within the first Fe LDE peak. Morozovella angulata follows a slow but constant rise, while M. praeangulata has the opposite trend. Comparable obervations were done on genus level at the Tethys Ocean, Tunisia (Guasti et al., 2006).

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