Orbitally paced bottom-water acidification episodes linked to the late Maastrichtian warming event: Calcareous nannofossil evidence in the Hor Hahar section, Israel

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The late Maastrichtian was characterized by a pronounced abrupt global warming of 3–4˚C from 66.3 to 66.1 Ma and by episodes of Deccan flood volcanism. A number of previous studies also observed a large increase in fragmentation of planktonic foraminifera, accompanied by a decrease in species richness of calcareous planktonic microfossils, which are related to a “dissolution” event in the late Maastrichtian. These observations have been tentatively linked to a significant lowering of seawater alkalinity in sea surface waters.

Here, we report new results on absolute and relative abundances of late Maastrichtian calcareous nannofossils from the Hor Hahar section in the Zin Basin, Negev Desert (30˚49'46.96"N, 35˚3'22.40"E, 160 m above sea level). A cyclostratigraphic study, which was performed on high-resolution elemental data acquired by X-ray fluorescence, constrains the section to the last ~410 kyr of the Maastrichtian, hence spanning the final Maastrichtian Deccan episodes and the late Maastrichtian warming event. Our high-resolution study of nannofossils, performed on 126 samples, revealed that the most abundant taxa are members of the highly solution-resistant group *Micula* spp., which, in some cases, constitute up to 80% of the whole assemblage. We observed a trend of increasing dissolution and high-frequency oscillations in the relative abundance of “robust” recrystallized specimens of *Micula staurophora*. These oscillations exhibit an out-of-phase relationship to a precession filter output obtained from the Si signal, attesting to an orbital pacing of early diagenetic phenomena, which is only possible if sediment pore waters, and hence bottom waters, were regularly affected by episodes of low alkalinity, possibly at insolation maxima. The timing of the first occurrence of recrystallized *Micula*, and an associated drop in the solution-susceptible species *Biscutum constans*, at 280 kyr before the Cretaceous/Paleogene boundary, nearly coincides with the onset of the Deccan greenhouse warming.