



End-Cretaceous global warming perturbed phytoplankton communities

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Phytoplankton responses to late Maastrichtian (end-Cretaceous) global warming (66.4-66.1 Ma), induced by extensive Deccan volcanic outpouring, can provide valuable insights into the long-term influences of global change on marine ecosystems. We performed palynological and micropaleontological analyses on three cores from the New Jersey paleoshelf, to assess the dinoflagellate response to this warming event and evaluate how this response affected the benthic ecosystem. Our records show that the Latest Maastrichtian Warming Event (LMWE), characterized by a 4.0 ± 1.3 °C warming of sea-surface waters on the New Jersey paleoshelf, resulted in a succession of nearly monospecific dinoflagellate cyst assemblages, characterized by very high abundances of the species *Palynodinium grallator* throughout the LMWE. This response was likely triggered by the combination of warmer and more thermally-stratified seas. Dinoflagellate assemblages at more offshore sites appear to be more affected than nearshore sites. This warming event, and related dinoflagellate response, is associated with an impoverished benthic ecosystem at the New Jersey paleoshelf. Assemblages characterized by a dominance of *P. grallator* appear to be a marker for the LMWE throughout the northern mid-latitudes, indicating that marine phytoplankton communities experienced a severe perturbation throughout this region in response to global warming. Our study suggests that warming global climates could lead to increased frequency and intensity of marine dinoflagellate blooms, presenting a potential perspective for our future oceans.