Dynamic oceanographic conditions in Arctic Spitsbergen during the Palaeocene-Eocene thermal maximum: new evidence from dinoflagellate cysts

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The Palaeocene-Eocene thermal maximum (PETM) ~56 Ma, provides an opportunity to study the response of the Arctic ecosystem to transient global warming. Previously published dinocyst data from Spitsbergen (Longyearbyen section) suggest maximum flooding and salinity changes around the peak of the PETM in the Arctic. However, these changes cannot currently be assessed on a regional (Arctic) basis due to coring gaps through the only other PETM succession known in any detail from the region, IODP Site 302-4A. Thus to provide a wider geographical overview of Arctic palaeoceanography (i.e. across the Spitsbergen Central Basin) we compare published results from Longyearbyen with data from two additional successions. Changes in dinocyst assemblages from core BH9/05 near Sveagruva and a new outcrop section at Bergmanfjellet demonstrate local and basin-scale acmes in dinocyst taxa, which imply pronounced spatial and temporal variability in palaeoceanographic conditions. Peak abundances of fully marine taxa coincide with maximum dinocyst diversities, confirming the presence of a maximum flooding surface at the peak of the PETM. Later influxes of the low salinity proxy *Senegalinium* indicate the presence of a surficial freshwater lens which decreased in influence from northeast to southwest across the Central Basin. This fresh water influx, combined with indicators of lowered oxygen conditions, confirm the establishment of salinity-driven water column stratification. Fluctuations in *Senegalinium* abundance indicate pronounced temporal variability in the intensity of terrestrial runoff and thus the hydrological cycle, and that maximum intensity was reached ~30 kyr after the onset of the carbon isotope excursion.