Absolute abundance, volume calculation and carbonate mass estimation of early Paleogene calcareous nannofossils

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Due to their large numbers, calcareous nannoplankton can be considered among the most important primary producers at the base of the marine food-chain. They are profoundly involved in the carbon cycle of the marine ecosystem, because they produce organic carbon and carbonate. They constitute a great part of the pelagic sediments produced for the last about 230 million years and thus can be used as a precious tool for palaeoecological and biogeochemical interpretations. During the past decades, volume calculation of extant calcareous nannoplankton has been performed in order to convert coccolith fluxes data into carbonate export productivity. Here, we present volume estimates of most abundant Paleocene calcareous nannofossil that are used to quantitatively evaluate the contribution of calcareous nannoplankton mass to the total carbonate production. Data come from several DSDP/ODP Sites located at different latitudes both in the Atlantic (DSDP 401 and ODP 690, 1051, 1260, 1263 Sites) and Pacific (ODP Site 1209). These results were applied to a specific case history in order to investigate the absolute abundance of coccolith, the coccolith carbonate mass per species and the total calcareous nannofossil contribution to carbonate production. For our exercise we have chosen one of the most prominent global warming episode occurred approximately 55.8 million years ago: the Paleocene Eocene Thermal Maximum (PETM). A dramatic decrease both in the number of specimens/mm^2 and in the carbonate production starts well before the onset of $\delta^{13}C$ negative shift and lasted for at least 100 Kyr, suggesting a gradual modification of pre-event conditions and a very perturbed paleoenviroment during the main phase of the event.