Extreme dwarfism of planktic foraminifera across the ETM2 in the Tethys realm

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While a lot of attention has been spent on the biotic response to the PETM, much less is known of the response of planktic organisms to the smaller Eocene Thermal Maximum 2 (ETM2, ~54 Ma). Here we combine planktic foraminiferal assemblage counts and size data to quantify the impact of environmental change, predominantly warming, on this group in the Madeago section (north-eastern Italy, western Tethys). Assemblages show a marked increase in warm water indices, surface-dweller acarininids, and decline of chiloguembelinids and deeper-dwelling subbotinids. Parallel to the warming indicated by oxygen isotopes, a pronounced dwarfism was observed which impacted both surface- and deep-water dwellers. As symbiont bearing and asymbiotic species were affected at the same scale, symbiont bleaching is not a likely cause. Causes for the reduced size may include resource limitation, warming, increased stratification, and a resulting decrease in oxygen levels. Warming accelerates the metabolic activity of protists thus requiring more oxygen and food. In this marginal setting, in analogy to the PETM nutrient influx should be high, but oxygen minimum zone might expand in response. This hypothesis can be tested quantifying the surface area which is related to food uptake relative to the cell mass and hence reproductive success.