

Plankton perturbations through the Eocene/Oligocene transition

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The Eocene-Oligocene transition (E/OT) was arguably the most significant period of climatic change in the Cenozoic and a major step in the development of modern glacial climates. Records from the equatorial Pacific show rapid and highly correlated increases in deep-ocean oxygen and carbon isotopes and a drop in the Calcium Carbonate Compensation Depth (CCD) of over a kilometer (Coxall et al. 2005). However, the role of surface ocean productivity changes, especially at low latitudes, within this carbon cycle perturbation remains open to question. Here we present high-resolution calcareous phytoplankton records from the Pacific, Atlantic and Indian ocean basins that reveal significant reorganization of planktonic niches coincident with the E/OT. These include a series of nannoplankton extinction events and major assemblage shifts that are closely coupled to the isotopic excursions. The assemblage shifts are not always expressed in the same taxa at the different locations but in all cases they indicate a coherent transition from broadly oligotrophic to eutrophic taxa through the E/OT. The onset of this transition precedes the start of the E/OT and $\delta^{18}\text{O}$ shift with the most important changes in assemblage compositions occurring before the E/OT at around ~34.6 Ma and at the second step in $\delta^{18}\text{O}$ at ~33.7 Ma. That similar changes are documented in planktic foraminiferal records and far more profound shifts are seen in the siliceous plankton, suggests that significant reorganisation occurred in the global surface ocean during the E/OT.

Reference:

Coxall, H. K., Wilson, P. A., Palike, H., Lear, C. H. & Backman, J. 2005. Rapid stepwise onset of Antarctic glaciation and deeper calcite compensation in the Pacific Ocean. *Nature* 433: 53-57.