Diachronous turnover in calcareous nannofossils following the EECO in the Tethys; evidence from Avedat, southern Israel

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The warm period of the EECO terminated in cooling. For a time, this trend restored typical Late Mesozoic paleoceanography, but cooling continued through the Middle and Late Eocene, until the later Tertiary oceanic thermal stratification pattern became established.

The Early and Middle Eocene of the Avedat plateau was deposited on the southern Levant margin of the Tethys. Calcareous nannofossil populations belong to zones NP 11 to NP 16, transecting the EECO. The initiation of cooling terminating of the EECO in Zone NP 13 was accompanied first by a discoaster acme and by an increase in nannofossil diversity that peaked in NP 14. A sharp fall in diversity followed, along with a significant reduction in discoasters taken to indicate the end of the oligotrophic regime. The next event related to this trend was at the NP15/16 transition, when Coccolithus-type forms were replaced by Reticulofenestra-type forms. The Coccolithus / Reticulofenestra biotic turnover marks the most important paleoceanic change of the Tertiary among the calcareous nannoplankton. The replacement became globally irreversible in the Late Paleogene, and the new pattern of dominance continues to the present.

However, this change took place 7 Myr earlier at Possagno (Agnini et al., 2006), at the first cooling of the EECO in NP 13. This substantial diachroneity is attributed to the paleoposition of the Possagno region at the northern edge of the Tethys at a significantly higher latitude, where cooling took place earlier. Cooling was much later at the tropical Levant paleolatitude.

Thus, on the one hand, calcareous nannofossil assemblages are among the first oceanic plankton to respond to the global reorganization of the later Tertiary following the EECO. On the other hand, the effects of global cooling were not instantaneous, and rippled latitudinally across the calcareous nannofossil assemblages of the Tethys.