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The evolution of late Paleocene-early Eocene carbonate platforms of the Tethys

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We present an overview on platform evolution data from several late Paleocene-early Eocene carbonate platforms from the Tethys. We focus on platform evolution in Egypt and Spain as these regions are biostratigraphically best defined and integrate data from other areas in the Tethys. These data indicate that the late Paleocene–early Eocene interval was a time of profound changes in shallow-water carbonate settings. A comparison of time-equivalent carbonate platforms in the low and middle latitudes shows a threefold Tethyan-wide carbonate platform evolution in the late Paleocene to earliest Eocene:

1) a late Paleocene (shallow benthic zone 3) coralgal-dominated platform stage;
2) a latest Paleocene (shallow benthic zone 4) transitional platform stage, where coralgal reefs thrived only at middle latitudes while the low latitudes were dominated by larger foraminifera (*Miscellanea, Ranikothalia, Assilina*) and
3) an early Eocene (shallow benthic zone 5/6) platform stage dominated at all paleolatitudes by larger foraminifera (*Alveolina, Orbitolites, Nummulites*).

The causes for the stepwise change from coral-dominated platforms to larger foraminifera-dominated platforms are multilayered. The early Paleogene was the time of the most pronounced long-term warming during the Cenozoic. During this time interval a calcite sea prevailed with very low Mg/Ca ratios, high CO_2 concentrations, and highly oligotrophic regimes. While the transition from stage I to stage II does not seem to correlate to a discrete global event, the transition from platform stage II to stage III coincides with the short-term Paleocene-Eocene Thermal Maximum that is characterised by increased global warming, a massive input of CO_2 and eutrophic conditions on shelf areas. The response of corals and larger foraminifera as the most important platform-building organisms to these long- and short-term trends resulted in these two steps of Tethyan platform evolution around the Paleocene/Eocene boundary.