



## **Paleocene to earliest Eocene coral assemblages: ecological decline or an alternative state of development?**

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A detailed investigation of Paleocene to Early Eocene corals from two mid-latitude settings, the Adriatic Carbonate Platform (Kras region, Slovenia) in the Tethyan realm and the Pyrenees (Minervois region, France) in the Atlantic, combined with a literature-based review of low and mid latitude coral occurrences, reveals an important decoupling between the history of corals and the history of reefs. The geological record shows that coral diversity and volume of carbonate buildups were often not correlated. During the Early Paleogene the coral reefs are quite rare in terms of absolute recorded numbers but their globally preserved volume is high and peaked in the Late Paleocene, followed by a drop in the earliest Eocene. The diversity was increasing throughout the Paleogene with many families surviving the end-Cretaceous extinction and proliferating into a diverse cosmopolitan fauna. Here we correlate the evolution of corals and their bioconstructional potential with the main ecological/environmental conditions depicting a possible scenario for the response of coral communities to future environmental changes.

The extreme environmental conditions, linked to the warmest time of the Cenozoic, promoted the expansion of marginal settings where corals evolved into highly adapted and moderately to highly diversified communities, with a limited frame-building capacity. Especially during the Thanetian, corals occurred associated to abundant calcareous red algae, sponges, serpulids and microbes, representing peculiar ecological

associations. We propose the hypothesis that these coral communities represent alternative states of coral development, completely different compared to the late Cenozoic coral reefs. It is clear that the study of this coral fauna evolution, especially during the warmest Late Paleocene-earliest Eocene time, represent a challenging opportunity to provide some hints to a non-actualistic state of ecological development.