BIOGEOGRAPHY, OCEAN HEAT TRANSPORT, AND A "COOLER" TROPICS

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Cretaceous Caribbean Province tropical boundaries are defined by the geographic limits of coral-algal and rudistid bivalve reefs. Both the northern and southern reef lines fluctuated in paleolatitudinal positions, suggesting dynamic rather than stable tropical environments. Latitudinal expansions of the reef lines were coincident with high rudistid bivalve diversity and the establishment of a warm, highly saline ocean/climate zone (Supertethys). Constrictions of the reef lines coincided with lowered diversity and regional or global extinction events. Oceanic heat transport by surface and subsurface water masses may have "cooled" the tropics and contributed to the latitudinal constrictions of the middle Cretaceous reef lines. Ocean general circulation model simulations support this hypothesis of ocean heat transport. Sedimentologic maps of evaporites plotted per stage add further credence to the existence, and destruction, of Supertethys. The Maastrichtian reef extinction predates the global K/T event by at least 1 My. There is no evidence for warm saline intermediate or bottom water production at this time, and the collapse of the Late Cretaceous reef ecosystem is not attributed to ocean heat transport but rather to increased rates of 2nd-order sea level fall associated with decreased $_pCO_2$ and climatic cooling, with the predictable effect of constricting shallow-water tropical ecospace and breaching ecological thresholds in tropical reefs.

The occurrence of all Cretaceous Caribbean coral-algal and rudistid bivalve reefs either on or north of the paleoequator suggests environmental asymmetry with respect to the paleoequator. Although climate and temperature are most often cited as regulatory mechanisms for tropical diversity, changes in the ocean/climate system, level of the sea and surface circulation patterns, and sedimentation rates and patterns were all important factors in Caribbean reefal history.

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