
Photozoan-Heterozoan Carbonate Systems: Evaluating Cenozoic and Mesozoic Examples

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ABSTRACT

Modern carbonate systems are subdivided into Photozoan and Heterozoan assemblages, based on the environmental requirements of the biocalcifying organisms which produce carbonate sediments. Because biocalcification mechanisms and environmental requirements have changed through time, it becomes increasingly challenging to apply this differentiation to older carbonate systems. Selected examples from Cenozoic icehouse and Mesozoic greenhouse time intervals are discussed to highlight the effects of major limiting factors in the geological past and to highlight how differences in biogenic assemblages impact both stratigraphic architecture and diagenetic potential in carbonate systems of different ages.

Icehouse times are generally characterized by stronger temperature and nutrient gradients, with environments spanning the full spread of possible conditions. Times of climatic changeover are recorded by broad, community shifts from the Photozoan to Heterozoan-Photozoan transition. Greenhouse times, conversely, are characterized by gentler temperature gradients and biota suggest that mesotrophic conditions were more widespread. This translates to a higher chance to find an expanded occurrence of Heterozoan-Photozoan transitional settings in warmer waters and across a much larger spread of latitudes.