

THE RESPONSE OF CORBIÈRES CARBONATE PLATFORM TO EARLY CRETACEOUS SUPER GREENHOUSE CONDITIONS

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Shallow marine reef systems are the most diversified ecosystems of modern oceans but face a severe threat from climate change: 91% of ecosystems in the Great Barrier Reef suffer from coral bleaching. To better understand how such ecosystems cope with environmental stress, a carbonate platform from the Corbières region of southern France serves as ancient analog as it developed during the Early Aptian OAE1a, a period marked by significant climate and volcanic activity.

The study sought to uncover how benthic carbonate-producing ecosystems adapted during this challenging period. The OAE1a is typically identified by distinctive shifts in carbon isotope composition ($\delta^{13}\text{C}$) values and increased organic matter preservation in deep marine settings. Identifying these shifts can shed light on factors favoring carbonate production.

The research proposes that warm, arid climates promoted reduced continental weathering and limited transfer of siliciclastic particles and dissolved nutrients that might enhance carbonate platform resilience. We identified seven out of eight segments of the OAE1a and specific microfacies in the Corbières region. Prior to the OAE1a, carbonate production was sustained by a photozoan assemblage with rudists and [insert main biota], with no changes in fauna and flora. A significant shift occurred at the interface between the Urgonian Marl that consists of siliciclastic-rich deposits with bryozoan and crinoid, indicating platform drowning and altered carbonate production.

In the aftermaths of the OAE1a, carbonate production not only rebounded but thrived in the upper Urgonian Marl and Urgonian 2 with the return of a photozoan assemblage. This research provides an understanding into the adaptability of carbonate ecosystems to environmental stress, potentially offering lessons for mitigating similar crisis in the future.