

The Latemàr — A Stayer Carbonate Platform in a Post-Extinction World

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The 10 m² isolated Triassic Latemàr platform in the Italian Dolomites was a powerhouse of carbonate production with surprising longevity: over an interval >1 Myrs, growth rates of the post-extinction buildup averaged 49 cm/kyr, which is about an order of magnitude above values from metazoan-built counterparts. A depauperate microbe-dominated reef occupied a low-relief bulge on the uppermost foreslope instead. Inboard, a cyclic interior facies, up to 500 m wide, with intermittently developing subaerial tepee megapolygons represented the buildup's crown, which in turn girt a shallow-water lagoon.

Shifting of sites of carbonate production and fixation through a lasting greenhouse period of high-frequency low-amplitude sea-level fluctuations resulted in balanced growth and keep-up across the platform interior: during lowstands, a hydraulic head between open sea and isolated lagoon expedited formation of a perimeter of subaerial groundwater springs and associated tepees. Ample early-diagenetic marine cements at these sites contribute to more than 50% of sediment thickness and exceed growth rates of platform areas still supplied with accommodation space. During highstands, the tepee belt was flooded and the hydraulic head vanished. Focus of carbonate production switched to the lagoon, where accommodation space was higher than above the tepee area. This temporarily reduced the relief between the inner bucket and the tepee belt. Coevally, saucer-shaped tepees trapped sediment redistributed from the lagoonal factory during storms and largely prevented off-platform transport.

In the Recent, metazoan reef margins account for buildup geometry and maintenance by bioclast export. Conversely, in the post-extinction Triassic, sites of highest growth were decoupled from slope maintenance by an adaptable microbial reef community sprawling across the foreslope. This explains why the Latemàr outpaces its modern counterparts providing an exceptional staying power despite rapid regional subsidence rates. It implies further, that growth rates at Latemàr directly reflect production potential of the buildup's interior. Curiously, much of this potential resides in the tepee belt by precipitation of marine cements in a zone of virtually no marine accommodation. It thus represents the buttress of the platform, providing protection for an incompetent lagoon, preventing off-platform transport, facilitating carbonate fixation by cementation and trapping, and averting drowning.