

DEEP OR SHALLOW – A REAPPRAISAL OF THE PALEOBATHYMETRY OF THE CAPITAN REEF (MIDDLE PERMIAN, SOUTHWESTERN USA) IN A GREENHOUSE WORLD

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The Capitan Reef has suffered minimal structural deformation and, thus, can be studied by the investigation of its superb outcrops. By the way, most researchers have meanwhile accepted the dynamic evolution from a ramp to a rimmed platform. Nonetheless, intense and controversial debates center around the fundamental question of the platform architecture during distinct time slices, especially for the Upper-Capitan massive during late Yates and Tansill times (Middle Permian, Guadalupian). Existing endmembers of depositional models comprise a seaward dipping outer shelf and reef as syndepositional shelf topography or a postdepositional compaction-induced subsidence of a prograding platform. Consequences of the interpretation are far-reaching for paleobathymetric interpretations and significantly influence estimates of the absolute water depth of the reef crest. Paleoecology and sedimentology may be useful to overcome the problem.

We test both depositional hypothesis by using paleontological, sedimentological, and geochemical proxy data, which form the synthesis of own new observations (by Al Fagerstrom) and the new body of data published in SEPM Spec. Publ. 65. Our most important reference locality is the famous outer shelf-reef transect at mouth of Bat Cave Draw, additional data derive from Dark Canyon and Hackberry Draw.

Depending on the different interpretation of the depositional profile, water depth of the reef crest varies between 15 and 35 meters. In addition, we confirm the model that the reef crest was never subject to subaerial exposure during the investigated time slice. Within a complex network of control mechanisms, we present evidence that the long-term transition from Early Permian icehouse to Middle Permian greenhouse climate with low-amplitude sea-level changes was a critical factor for the evolution of the Capitan Reef.