

Genesis of a locality of Exceptional Fossil Preservation: Paleoenvironments of the Tepexi limestones (mid-Cretaceous, Mexico)

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This study attempts to constrain the paleoenvironmental setting of Tepexi limestones, a mid-Cretaceous (Aptian?) locality with exceptional fossil preservation in Mexico. The study consists of three lines of analysis including: (1) optical petrography, (2) statistically based microfacies-transition analysis to reconstruct the pre-diagenetic lithology, and (3) spectral analysis of depth-series measurements to recognize paleoclimate variables. Tepexi limestones are largely composed of laminated micrites, and presents a complex amalgam of primary and diagenetically altered fabrics. Microfacies succession reconstructed by transition analysis indicates recurring upward-fining sequences, and suggests deposition by suspension settling. Spectral analysis of depth-series measurements of magnetic susceptibility and RGB visible color (redness) reveals a pattern of repetition in the sedimentary sequence that is concordant with patterns of Milankovitch cyclicity, and implies an average rock accumulation rate of 2.0 cm/kyr. Previous reconstructions of the Tepexi paleoenvironment (e.g., a variety of back-reef lagoonal settings) do not match the observations reported here. Tepexi limestones appear to have been deposited in an open-marine basin with storm-dominated sedimentation and bottom waters with restricted circulation. The fossil biota has a strong terrestrial influence, indicating that land was close by.