

HIGH-RESOLUTION SEQUENCE STRATIGRAPHY AND FACIES ARCHITECTURE OF THE CRETACEOUS GALLUP SANDSTONE IN SAN JUAN BASIN, NEW MEXICO, USA

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ABSTRACT

It has been increasingly agreed that Milankovitch cycles are an important component in controlling high-frequency sequence stratigraphy in the Cretaceous Period, but there are few well documented examples in the Cretaceous Western Interior Seaway. An analysis of high-resolution sequence stratigraphy, associated with variations in shoreline trajectory and accommodation successions based on the well-exposed and continuous outcrops of the Gallup Formation in New Mexico allows documentation of high-frequency stratigraphic cyclicity and the controlling factor(s). The Gallup Sandstone has been previously interpreted as a shoreface strand plain or barrier island in a wave-dominated environment. This depositional model needs to be re-examined as the along-strike facies variability and obvious fluvial influence have been observed. A recently promoted asymmetric wave-influenced delta model will be tested to explain the lateral facies variation. High-resolution outcrop sequence stratigraphic analysis potentially allows for evaluation of high-frequency vertical and horizontal facies variations and evaluation of shoreline trajectory that is controlled by climate-driven eustasy. The study area comprises a 60 km long relatively continuous outcrop belt of the Gallup Sandstone, oriented along the depositional-dip direction. Data including lithofacies, trace fossils, body fossils, sedimentary textures and structures, and orientations of paleoflow are mainly derived from measured sedimentological sections. Bentonite layers are used as isochronous datums. This study will evaluate the nature of high-frequency cyclicity of stratigraphic sequences during a global Greenhouse, and will attempt to distinguish their relative external and internal controls. The study also addresses how high-resolution sequence stratigraphy can be applied to deep-time rock records and how it can be linked to depositional-system reconstruction.

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