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Sequence Stratigraphic and Paleoecologic Lowstand Model of Ephemeral Connections in Epeiric Seaways, U.S. Western Interior Cretaceous

High-resolution sequence stratigraphy of mid-Cretaceous (Albian-Cenomanian) strata in the U.S. Western Interior between Wyoming and Texas reveal that rocks generally attributed to transgression during the early part of the Greenhorn third-order cycle record three thin sequences of unusually large regional extent deposited during three lower-order marine cycles. The three sequences are best exposed in the Oklahoma Panhandle section of the Dakota Formation.

Each sequence records biofacies shifts of over 200 km within vertical sections of less than 20 m that mark ephemeral connections between Boreal and Tethyan realms across eastern Colorado. In each sequence, basal fluvial-estuarine sandstone with non-marine fossil assemblages passes vertically into a section of marine-influenced shale and sandstone. Biofacies in marine-influenced units show a progressive loss of marine influence up dip. Marine palynomorphs and a diverse Skolithos ichnofacies dominate coastal plain strata up dip of marine shoreface and shelf deposits. Marine fossils become progressively depauperate up dip until only brackish-tolerant ichnofauna and non-marine palynomorphs remain. The shift from coastal marine to near terrestrial fossil assemblages spans a distance of over 200 km. The sequence boundaries separating these thin sequences are unique mappable surfaces over the length of this transition. The depauperate fauna record intervals when ephemeral biotic connections allowed limited and selective exchange of Tethyan and Boreal fauna.

These strata illustrate that transference of marine biota and integrity of sequence boundaries may extend for very long distances up dip on low gradient systems. Likewise, even ephemeral connections between oceans may permit limited exchange of biota having paleoenvironmental and biostratigraphic significance.