Hierarchical Organization of Strata Within a High-Frequency Milankovitch-Scale Fluvial Sequence, Cretaceous Ferron Notom Delta, South Central Utah, USA

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Abstract

Detailed characterization of fluvial strata or fluvial reservoirs can be achieved by the integration of all the facies within such succession. In this study we investigate the stratigraphic organization within a previously defined ~ 100,000 year non-marine sequence. Detailed description and correlation of channel facies, floodplain facies, paleosols, and coals reveal a hierarchical organization of strata, which include fluvial aggradation cycles, fluvial aggradation cycle sets, and 3 higher frequency sequences. Fluvial aggradation cycles in the succession are represented by simple floodplain bedsets or single channel storeys that are capped by immature paleosols or erosionally truncated. Fluvial aggradation cycle sets consist of multiple fluvial aggradation sets that are capped by relatively mature paleosols as well as coals and carbonaceous strata, or may be erosionally top-truncated. Fluvial sequences consists of multiple fluvial aggradation cycle sets that are bounded by extensive (or regional) erosional surfaces or surfaces of non-deposition that are represented by the most mature paleosols in the entire succession. Fluvial aggradation sets are interpreted as representing floodplain or channel depositional events that are followed by short-lived abandonment and immature paleosol development. They span not more than 2000 years. Fluvial aggradation cycle sets represent multiple episodes of floodplain and channel deposition followed by a relatively long period of abandonment and paleosol development, which is attributed to long-term river avulsions. Marine trace fossils and dinocysts associated with coals beds that cap fluvial aggradation cycle sets suggest marine transgression due to compactional subsidence or sea-level rise. Fluvial aggradation cycle sets span not more than 14, 000 years. Fluvial sequences are attributed to higher frequency Milankovitch-scale base-level rises and falls in sea-level.