Close Proximity High Resolution Chemostratigraphic Profile of the Upper Cretaceous Formations of Central Texas, USA

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ABSTRACT

The formations of the Late Cretaceous period (Comanche/Gulfian Series) overlying the San Marcos Arch in Central Texas consist of varying silica-rich and carbonate-rich mudrock successions. Twelve drill cores were recovered from the 9000 m^2 (2.22 ac) construction site of the AT&T Executive Educational and Conference Center on the University of Texas at Austin's main campus. Two cores were analyzed in detail with a combination of traditional visual description and hierarchical cluster analysis of elemental composition collected using energy dispersive X-ray fluorescence (ED–XRF). The cores, B–12 and B–2, are 44.27 m (145.23 ft) and 44.60 m (146.31 ft) in depth, respectively. The ED–XRF samples were collected at 0.08 m (0.25 ft) intervals to provide a high-resolution view of the facie changes within the formations. The two cores demonstrate a high degree of similarity in both visual interpretation as well as chemostratigraphic profiles, allowing for the use of the ED–XRF to provide accurate, reproducible results. Within the cores, four formations were identified: Del Rio (Grayson) Claystone, Buda Limestone, Eagle Ford Group, and Austin Chalk. These four formations were broken down further into facies based on visual and elemental concentration changes, specifically silicon and calcium percentages. Analysis of elemental compositions of aluminum and titanium indicate that the silicon is mostly of terrigenous origins rather than biogenic, allowing for interpretation of changes in sediment supply. Finally, the enrichment of certain redox elements (sulfur and molybdenum) indicates a level of anoxia within the paleoclimate of the mouth of the Western Interior Seaway. These elements are present during the more Si dominated intervals (Del Rio Clay/Eagle Ford Group) leading to a correlation between anoxia and deposition of organic-rich mud rocks, often referred to as oceanic anoxic events (OAE).