

Stratigraphic Evolution of the Upper Cretaceous Austin Chalk Group on the San Marcos Arch and its Relation to Deep Basement Structure

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ABSTRACT

An integrated outcrop and subsurface study of the Upper Cretaceous Austin Chalk Group across the San Marcos Arch was conducted to understand the influence of regional paleotopography on facies and sequence architecture. Select outcrops in Bexar and Comal counties were measured and described; in addition, handheld gamma ray scintillometer profiles were obtained from the measured sections. Geophysical logs of boreholes drilled through the Austin Chalk offered data to better link the subsurface with the surface outcrops. The Austin Chalk in Bexar County is divisible into 6 chalk packages that are bounded by regionally extensive surfaces that are traced into the subsurface. Outcrop and subsurface data from the San Marcos Arch illustrate anomalous thickness variations in individual chalk packages that appear to be related to changes in paleotopography during deposition. The lower 3 chalk packages all thin across the northwest-southeast trending San Marcos Arch, but also thin across a northeast-southwest trending antiformal structure within the interior zone of the buried late Paleozoic Ouachita Orogen known as the Luling Uplift. The up-to-the-coast faults of the Luling system bound this structure to the northwest while down-to-the-coast faults of the Karnes system bound this structure to the southeast. Thickening of the lower chalk packages to the northwest and southeast of this structure indicates that faulting was active during deposition. The upper 3 chalk packages are less affected by the San Marcos Arch and Luling Uplift and show maximum thinning in central Bexar County. A physiographic change transformed the mini depocenters of the lower Austin into shallow water platforms marked by nondeposition and hardground formation. Platform areas of the lower Austin were transformed into slope-basin settings during deposition of the upper Austin. These physiographic changes are concomitant with volcanism of the Balcones Igneous Province during late Austin time.

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