Gravity-Flow Deposits in the Upper Cretaceous Austin Chalk B Unit in South and Central Texas and their Relationship to Contemporaneous Volcanism

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ABSTRACT

During deposition of the upper part of the Austin Chalk (AC) Group (B-unit) in the Maverick Basin and San Marcos Arch areas, contemporaneous volcanism was occurring in the area (Balcones Igneous Province). The general regional depositional setting was a deeper water drowned shelf where chalks composed of planktic foraminifers, inoceramid fragments, and calcispheres in a finer matrix of coccolith hash were being deposited. Deposition is interpreted to have been below storm-wave base based on sedimentary features and biotas. However, adjacent to the volcanic mounds, water depths shallowed and shallower water biotas populated by benthic foraminifers, oysters, echinoderms, corals, and rudists were established. Glauco--rich carbonate floatstone debrites are common in the AC–B unit. These debrites are up to several feet thick and may be interbedded with layers rich in highly-altered volcanic ash. The debrite-rich AC–B unit thins from ~600 ft in Maverick County in the far west to less than 50 ft thick on the San Marcos Arch to the east. Depositional processes included both mud-flows (?5% clasts) and debris flows (>5% clasts). Composition of the debrites is variable. Soft-sediment lime lithoclasts and hardground-derived lithoclasts are present. Some debrites are composed of abundant relatively intact inoceramid shells (related to a lack of bioturbation). The debrites show an increase in shallower water biota components compared to the general deeper water, regionally in-place deposited Austin Chalk. The abundant glauconite in the AC–B unit originated in the shallower water setting and was transported in the debris flows. The glauconite is postulated to be volcanic ash altered by marine waters. The debrites are considered to be common in the AC–B unit because of the contemporaneous volcanism that would have triggered the debris flows through earthquakes. The establishment of the relationship between debris flows and volcanism explains the unique character of the AC–B unit.

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