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High-Resolution Facies Analysis and Depositional Architecture of the Buda Formation in Central Texas

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ABSTRACT

The Upper Cretaceous Buda Formation outcrop extends from West Texas to northern Fort Worth County, and extending continuously in the subsurface from South to Central Texas. Three facies (from deepest to shallowest) are interpreted from core and outcrops: foraminfera mudstone, skeletal wackestone/packstone, and massive mudstone. Outcrops are mainly composed of skeletal wackestone with massive mudstone, while cores are dominated by globigerinid mudstone and skeletal wackestone/packstone. Both outcrops and cores are extremely burrow mottled. 2D strike and dip cross sections constrained by cores indicate the thickness of the Buda Formation varies significantly from 20 to 100 feet through Central Texas. Considerable thickening of the Buda Formation within the trough between Edwards and Sligo paleo-shelf margins occurs in southern Wilson, northern Karnes, and Gonzales counties of Central Texas. The dramatic variations of the Buda Formation thickness along the dip direction are consistent with filling differential accommodation space across the paleotopographic profile of the pre-existing Lower Cretaceous reef trend. Meanwhile, facies variations from the outcrop and subsurface data record a transitional change of the depositional environments from inner ramp to subtidal shallow marine. The abundance of bioturbation and benthic forams across the depositional profile suggests deposition occurred along a welloxygenated, low-relief ramp. 3D depositional facies models show Buda Formation evolution through time in Central Texas, and provide insights into reservoir evaluation and development.

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