
Revisiting the Cow Creek Limestone: Facies Architecture and Depositional History of a Greenhouse Strandplain

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ABSTRACT

The Early Aptian Cow Creek Formation (*Dufrenoya justinae* zone) of Central Texas provides a textbook example of an mixed clastic-carbonate strandplain that is exposed for 30 km in a north-south direction parallel to progradation (possibly 50 km), and 25 km along strike. The Cow Creek lap-out along the southeastern shorezone of the Llano Uplift illustrates a remarkably stable progradation angle and has a unimodal progradation direction with prevailing easterly longshore drift. Detailed mapping shows that foreshore (swashzone) heights are typically 1.5-2 m. Upper shoreface deposits consist of trough cross-stratified oyster grainstones and minor intercalated sandstones with bedset thickness of 0.1-0.3 m and consistent eastwardly directed longshore transport. Lower shoreface wavy-laminated quartz-oyster grainstones are up to 50% siliciclastics, with distinctive dolomite concretions associated. Additional facies farther seaward are lower shoreface oyster rudstone banks of 1-2 m thickness and thin bedded silty skeletal packstones of offshore setting. Reconstructing the ideal Cow Creek clinothem suggests that average wave heights would have been less than 1 m, and judging from 40+ km width of the Cow Creek shelf this seems reasonable as only wind-driven waves could move effectively across this shallow shelf. Tidal range would also fall in the 1 m range, and fair-weather wave base would have been a relatively shallow 5 m. The development of this broad strandplain exceeds that seen on earth's surface today, and testifies to the combination of stable tectonic setting and remarkably stable eustatic conditions only possible during a greenhouse Milankovitch setting.

Owens, L., and C. Kerans, 2010, Revisiting the Cow Creek Limestone: Facies architecture and depositional history of a greenhouse strandplain: Gulf Coast Association of Geological Societies Transactions, v. 60, p. 907-915.