

Wolfcampian carbonate platform sequence stratigraphy on the southwestern margin of the  
Delaware Basin: Wylie Mountains, Van Horn, TX

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The Wolfcamp unconventional play in the Permian Basin is currently one of the most active drilling targets in North America. Despite its economic importance, the Wolfcampian interval in the Delaware Basin lacks a detailed platform-to-basin sequence stratigraphic model. This study presents a stratigraphic framework from the Wylie Mountains near Van Horn, Texas that records middle to late Wolfcampian deposition in the southwestern Delaware Basin. These inner shelfal carbonate strata correlate with outer shelf to basinal deposits to the northwest in the Sierra Diablo Mountains on the western shelf of the Delaware Basin. This combined data set allows for the recognition of both eustatic and tectonic controls on shelf-to-basin stratigraphic architectures.

Eleven measured stratigraphic sections totaling 1450m were used to generate a 300m composite section for the Hueco Formation exposed in the Wylie Mountains, which records middle to late Wolfcampian carbonate sedimentation overlying the early to middle Wolfcampian Powwow Formation siliciclastics. Nine depositional facies are recognized from field observations and supplementary petrographic data. These facies are grouped into 4 depositional facies tracts, including low energy inner ramp, high energy inner ramp, tidal flat, and a breccia facies. Three high frequency sequences (HFS) were interpreted based on 1D and 3D facies and cycle stacking pattern analysis, including two middle Wolfcampian HFSs and one late Wolfcampian HFS. The late Wolfcampian HFS backsteps relative to the middle Wolfcamp, consistent with observations in the Sierra Diablo Mountains and in the subsurface.

The top of the Hueco Formation in the Wylie Mountains is truncated by an erosional unconformity with a minimum of 20m of erosional topography succeeded by an influx of siliciclastics in the basal Leonardian. This clastic pulse is related to a significant drop in sea level at the end of the Wolfcampian. This revised shelfal framework provides insight into relative base level changes in the Wolfcampian that control deposition in the Delaware Basin. Further, there is potential for correlating shelfal strata with their basinal equivalents based on the bracketing of the Hueco Formation in the Wylie Mountains by major clastic pulses in the Powwow Formation and basal Leonardian.



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