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Controls on Late Guadalupian Toe-Of-Slope Bedding-Termination Patterns, Guadalupe Mountains: Implications for Carbonate Sequence Analysis

Late Bell Canyon deep-water limestone tongues have variable bedding termination patterns against slope carbonates and basinal siliciclastic siltstones due to differences in carbonate sediment type and transportation mechanism. Grain size and depositional mechanism control bathymetric slopes, and the change in bathymetric slope is responsible for the bedding termination patterns.

Onlapping basinal beds are predominantly suspension-deposited siliciclastic siltstones. Most peloidal, low-density turbidite deposits show apparent onlap onto muddy debris-flow deposits and conformable toplap due to their low depositional slope. Bioturbated peloidal wackestones may have somewhat steeper depositional slopes where incipiently cemented. Mud- and silt-matrix debris-flow deposits interfinger with the low-density turbidity current deposits to form apparent onlap or downlap patterns. Some channelized mud and silt-matrix debris flows extend to the lower toe-of-slope where overlying and underlying contacts are approximately conformable. Mud- and silt-matrix debris-flow deposits also onlap steeply dipping, mud-free carbonate sands and boulder conglomerates higher on the slope. Only mud-free boulder conglomerates of the slope show true downlap.

Sea level controls bedding termination patterns mainly by varying sediment type (mud vs. sand and boulders) and total sediment supply. Lowstand and transgression carbonates are boulder conglomerates (rock falls) deposited on the slope. Once the shelf is flooded during highstand, significant quantities of carbonate mud can be produced. Mud bypasses the middle slope, mixes with skeletal and fragmental carbonates on the lower slope, and accumulates lower down on the toe-of-slope and proximal basinal facies as turbidites and suspension deposits.