

## **Digital Grain Size Analysis of the Middle Rader Debris Flow: Insight into its Depositional Energy**

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The second member of the tripartite Rader Limestone which crops out in the Guadalupe Mountains, near McKittrick Canyon, and occurs within the Bell Canyon Group of the Late Guadalupian strata has been interpreted as a carbonate sediment gravity flow. This unit contains large limestone boulders supported by a sandy matrix, and above this unit is a series of 2-3 hummocky cross stratification cosets. Understanding the process energies responsible for its deposition in deep water is fundamental to a proper understanding of the Rader and of possibly similar event stratigraphies elsewhere within the Delaware Basin. Previous analyses by other researchers have shown that the Rader deposit thickens toward the Guadalupe Mts. and thins basinward. The Rader has clasts which were composed of unlithified forereefal material and does not record back reef lithologies. Thin section petrography reveals prior oil migration within the beds.

A key to interpreting process energies is textural analysis. However, as the outcrop is lithified, grain size analysis conventionally done by sieve is intractable and point counting would be incredibly tedious and consume large amounts of time.

An alternative novel method is the application of Digital Grain Size Analysis (DGSA) through a modified MATLAB Script constrained to known sieved samples from around the world and then directly applied to the Rader. The script analyzes the numerous rows of pixels and the changes in amplitude of the pixels to determine the grain size. The analyses performed upon a LiDAR scan of the outcrop demonstrate textural differences between several episodes or events in the outcrop revealing pulses of high and low energy states with associated textural maturities.