

## Outcrop Characterization of Ooid Grainstones in the Grayburg Formation, Guadalupe Mountains, New Mexico

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Ooid grainstone reservoir architecture remains poorly understood, particularly because of sedimentological heterogeneities that are innate to grainstone body development. The importance of developing such understanding is apparent when one considers ooid grainstones' high porosity and permeability in outcrop, and the fact that they form significant reservoirs in the subsurface. The Grayburg formation (Late Permian, Guadalupian) is a mixed carbonate-siliciclastic, known producing interval in the Delaware and Midland basins which contains abundant ooid grainstone geobodies. Outcrops at Shattuck Escarpment provide a chance to gain a high-resolution geospatial and paleocurrent understanding of the Grayburg's ooid geobodies to assist in characterizing their subsurface reservoir counterparts. Promontories along the escarpment provide outstanding exposures over 5 kilometers at which one can observe dip-oriented changes from the grainstones in the High Frequency Sequence (HFS) G11 (Kerans and Kempter, 2002) or HFS 2 (Barnaby and Ward, 2007). Preliminary data has shown that the grainstones' most up-dip limit has a maximum height of 3 meters, and thins to 50 centimeters over 2 kilometers in down dip direction. Coincident with these bed height changes are internal bedform changes. The majority of cross-strata dip south-east towards the Grayburg shelf margin with dips of larger beds (0.5-1.8m) deviating up to 15 degrees from the margin, and smaller beds (10-50cm) deviating up to 90 degrees from the margin. This margin, defined by Kerans and Kempter (2002), is roughly 5 kilometers from the outcrop location. Geospatial and paleo-current measurements at the Shattuck Escarpment are acquired using measured section, strike and dip, and LiDAR. Measurements will be compared to modern analogs of strike-continuous ooid grainstone deposits of the Bahamas, characterized by Harris (2010), Rankey et al. (2006) and Hine (1977). These modern studies thoroughly document processes that create ooid grainstone deposits, yet there is insufficient documentation of how they are preserved in the rock record. 30 cm spaced vertical core plug transects will be taken at regularly spaced positions from up-dip to down-dip positions of the grainstone geobodies along the outcrop in order to document changes in porosity and permeability in relation to the documented changes of the grainstone geobodies. Collectively, the results of this study will provide insight into sedimentary architectural variability of ooid grainstones in outcrop, which can be used to understand problems with production, as well as predict the geospatial distribution of these grainstones in analogous subsurface ooid grainstone reservoirs.

**Keywords:** Ooid grainstone, bedform, Grayburg, Permian, Outcrop, Guadalupe Mountains, LiDAR, core plug, ooid grainstone reservoir, geospatial.