Photogrammetric Analysis of the Clayton Lake Dinosaur Tracksite, 
Early Cretaceous of Northeastern New Mexico

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At the NMGS Spring Meeting in April of 2021, our CNM/NMMNH team made a presentation on the use of drones to aid in the collection of paleontological data. Our specific project was to collect data on the Early Cretaceous dinosaur tracksite at Clayton Lake, NM. At the time of the 2021 Spring Meeting, the data had been collected, but processing of the dataset had just begun. Those data consist of 3,632 files containing 29.9 gigabytes of terrestrial and drone imagery. Pix4D, the leading photogrammetry software for professional drone mapping, was used to create three-dimensional computer models in fbx format. Processing was time consuming; for example, “terrestrial” images, taken by camera to produce 3-D models of individual tracks and other features, took 12-20 hours of computer processing per model. The processing resulted in an additional 1.9 gigabytes of data in 32 files. As of the Spring Meeting in 2022, all of the data have been processed, and we can present the results. The photogrammetric data have been used to create a map/orthophoto of the tracksite with mm-scale contours that can serve as a baseline for future management and monitoring of tracksite changes due to erosion and weathering. The fine-scaled imagery allows a variety of metric analyses of the tracksite to be undertaken to evaluate the taphonomic history and dynamics of the tracks. Approximately 533 dinosaur tracks have been identified and documented. Of these, 182 can be grouped into 28 trackways. For these trackways we can estimate the hip height, speed, and bearing of the trackmaker. The photogrammetric data also reveal the complexity and defects of the Clayton Lake dinosaur tracks, which represent multiple episodes of footprint formation on substrates of diverse viscosity so that track quality is relatively low, and there is extensive extramorphological variation of the tracks. The photogrammetric data and the resulting maps and models of the tracks allow for detailed exploration and analysis directly on the researchers' computers in their offices. However, some very fine details, specifically tracks with positives and tracks that have been trampled over, are difficult or impossible to see in the contour data. For these details several on-site visits were conducted to the tracksite to verify the map and anchor the detailed analysis of the trackmakers’ hip heights, speed, and bearing of movement.

References:

Kvasnak, M. et al., 2021, Clayton Lake Dinosaur Tracksite Project: Paleontology by Drone, NMGS Spring Meeting 2021

Rogers, J. et al., 2022, Preliminary Estimates of Dinosaur Size and Speed at the Early Cretaceous Clayton Lake Dinosaur Tracksite, Union County, New Mexico, NMGS Spring Meeting 2022


2022 New Mexico Geological Society Annual Spring Meeting & Ft. Stanton Cave Conference
April 7-9, 2022, Macey Center, Socorro, NM
Online ISSN: 2834-5800