CLAYTON LAKE DINOSAUR TRACKSITE PROJECT: PALEONTOLOGY BY DRONE

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The use of small unmanned aerial systems (sUAS), i.e., drones and photogrammetry, in the fields of paleontology, archeology, and geology are relatively recent developments. The commoditization of drone technology over the past five or so years combined with now readily available structure-from-motion, photogrammetry, and three dimensional (3-D) modeling software has led to the ability to improve the scientific collection of field data and then create 3-D models of these natural features. In the Spring of 2019 a team of students from Central New Mexico Community College (CNM) and scientists from the New Mexico Museum of Natural History and Science (NMMNH) and CNM, spent a week at Clayton Lake State Park and Dinosaur Trackways in an effort to extend the work of Dr. Spencer Lucas of NMMNH and try new techniques in photogrammatic data collection developed by Dr. Richard Watson of CNM.

During the five days of on-site work, three types of image data were collected: drone, terrestrial, and LiDAR. The data were then processed through photogrammetry software to create 3-D densified mesh models and a high precision digital surface model (DSM) of the dinosaur tracksite. A unique aspect of this project was the creation of a website to showcase and visualize these dinosaur tracks and tracksite, to expand public awareness and education about the site and aid in developing future research directions.

At Clayton Lake in Union County, northeastern New Mexico, an extensive dinosaur tracksite is exposed in the dam spillway. Tracks are present at four stratigraphic levels across the contact of the Lower Cretaceous (upper Albian) Mesa Rica and Pajarito formations. The main track level is on the top sandstone bedding surface of the Mesa Rica Formation. Previous studies have counted 200-300 dinosaur tracks at this level that are mostly of ornithopods (Caririchnium), but that also include two kinds of theropod tracks (Magnoavipes, cf. Irenesauripus) and a single quadrupedal trackway of an ankylosaur? (Deltapodus). The associated invertebrate ichnoassemblage is shallow burrows assigned to Arenicoilites, Planolites, Taenidium and Thalassinoides, representative of the Scoyenia ichnofacies. The paleoenvironment of the tracksite is broadly interpreted as a sandflat at or very near the shoreline of the Western Interior seaway.

The fusion of the image data collected of these dinosaur tracks at multiple heights and resolutions with geospatial reference data has resulted in a highly accurate orthophotograph and DSM of the entire tracksite. From this DSM and orthophoto additional tracks not originally observed in the previous site surveys are now apparent. Current efforts are on-going to process the tens of gigabytes of images and produce scaled 3-D models of the tracks and identify additional potential tracks. These models can then be used to determine the size, weight, and stride length of the individual creating the track. Additionally, 3-D models suitable for website viewing and 3-D printing are being created.