RESOURCE NOTES

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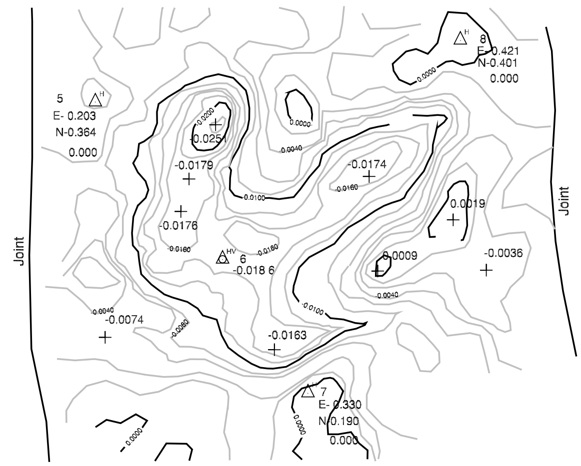
What Dinosaur Left These Tracks?



This question was recently answered at BLM's Red Gulch dinosaur tracksite in Wyoming through the use of close-range photogrammetry and computer modeling techniques.

In the past, paleontologists had to spend a great deal of time at the site where dinosaur tracks were found to answer this question. Their main resources for determining what species of dinosaur made the tracks were the tracks themselves. But what if the site was not always accessible or further analysis was required in a laboratory setting?

Traditional methods, such as casting, have sometimes been used for studying dinosaur tracks when it is not feasible to use the original tracks. But casting can be harmful—at best, casting can leave material in the tracks that can collect water and hasten erosion, and at worst, it can remove bits of rock from the tracks.

In order to minimize damage and preserve the original tracks, the Bureau of Land Management's National Applied Resource Sciences Center (NARSC) has been exploring other options for analyzing these precious resources. Close-range photogrammetry is one option that has been tested at Red Gulch in Wyoming. By combining the science of photogrammetry with the modeling capabilities of today's computer software, BLM is stepping from the past into the future.

WHY PHOTOGRAMMETRY?

Photogrammetry is the science of making measurements from photographs. Close-range photogrammetry allows for precise measuring without degrading an object or causing it harm.

Traditionally BLM has used photogrammetry to compile features from standard aerial photographs, including topographic contours, drainage features, vegetation, roads, and other man-made features. Now, specialists at NARSC are applying these methods to assist BLM and university paleontologists with scientific investigations in the field by producing topographic contour maps and controlled stereo-

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graphic images of individual dinosaur tracks.

The contour maps provide details such as the depth of the track, in millimeters, and equal elevation contours that highlight the morphology of the track, as well as other features that appear on the rock strata. By using the photogrammetrically generated contours, a paleontologist can study the impression made by the dinosaur's foot to help determine species, height/weight, and stride.

Controlled stereographic color images, when viewed with red/blue glasses, bring out the depth of the track. Along with the contour maps of individual tracks, they can be used for further analysis in a laboratory setting, even by scientists who have never been to the original sites. They can also be used as a baseline for future comparison to determine the effects of visitation and erosion.

HOW PRECISE ARE THE MEASUREMENTS?

By using a calibrated camera, measurements can be taken to within $\pm$ 1 millimeter. A calibrated camera has a detailed report that gives the precise measurements of the reseau grid (the + marks on the photo), as well as the optical distortions of the lens. This camera, in combination with a few precisely located control points, allows for detailed measurements of the track.

WHAT DOES THIS MEAN FOR FUTURE RESOURCE MANAGEMENT?

Paleontology is just one application for photogrammetry — the potential for many other applications is great. Projects using close-range photogrammetry provide opportunities for BLM to apply its traditional method of accomplishing work in new and innovative ways.

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