Radar reveals ghostly footprints at White Sands

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Ground-penetrating radar could help archaeologists spot otherwise invisible ancient footprints, suggests a recent experiment at White Sands National Monument, New Mexico.

Tracks left behind in layers of hardened mud and sand at the site record where humans crossed paths with giant sloths and mammoths during the last Ice Age. But some of the tracks appear only when conditions are just right—usually after a rain—which makes them difficult to study. Archaeologist Thomas Urban of Cornell University and his colleagues used ground-penetrating radar to spot these so-called ghost tracks. The radar images also revealed layers of compressed sediment beneath mammoth tracks, which could reveal information about how the now-extinct woolly giants strode across the Pleistocene world.

Invisible ink

To test the method, Urban and his colleagues pulled a radar antenna across the pale gypsum sands of the former lakeshore, pacing out a grid pattern over a site where, 12,000 years ago, a human and a mammoth crossed paths. Excavations at the site had already revealed “ghost prints” left by a person who walked north, and then back south, for about 800 meters (2,625

feet).

Sometime in the past, the prints filled with sediment and then got covered by a layer of fine gypsum sand, so they're usually invisible from the surface. But the sediment filling the tracks holds more moisture than the sediment around them, so when there's just the right amount of water present, the tracks stand out dark on the pale ground. They appear and vanish again like a message written in invisible ink.

Archaeologists already knew one location along the trackway had about 27 ghost prints. When Urban and his colleagues put their radar to the test, the images revealed 26 of the prints—and the images were detailed enough to calculate the length of the person's stride and estimate their stature. It turns out that the sediment filling the tracks also reflects radar signals differently than the surrounding material, making it possible to detect otherwise invisible tracks.

Farther north along the same trail of human footprints, Urban and his colleagues noticed a set of anomalies that looked like animal tracks. These were in a place where the playa's surface looked blank and archaeologists hadn't documented any tracks. After a rain, the anomalies turned out to be sloth tracks. Urban and his colleagues say their results suggest that the ground-penetrating radar could help archaeologists search for other ghost tracks. That could help researchers avoid having to wait for specific weather conditions to find tracks and could boost efforts to preserve the ancient stories written across the desert in invisible ink.

- Ghost prints are a common phenomenon in playa landscapes like White Sands.
  Urban et al. 2019
- Urban and his colleagues say they avoid visiting possible track sites in wet conditions, to avoid damaging them.

Urban et al. 2019

- In this close-up radar image, you can see a mammoth print, a human print, and a sloth print.
  Urban et al. 2019
- These human and mammoth tracks have been excavated and date to around 12,000 years ago.
  Urban et al. 2019

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