



## Impactful tool of discovery for archaeologists

For archaeologists, an ever-changing physical and political landscape poses challenges to identifying, assessing and preserving ancient sites. It's a race against the clock given shrinking budgets, climate change and human intervention. Recently, however, satellite imagery has taken on an important role in the the discovery process, including the detection of an amphitheater at the Portus, Italy, archeological site, a landmark that had eluded researchers for decades.

### Archaeological sites are threatened

For decades, magnetometers—instruments that measure the magnitude and direction of magnetic fields—were tried and true tools for archaeologists. But magnetometers have limitations. They are expensive to use, require a particular expertise to operate, and do not adequately account for changing soil conditions, which are crucial to understanding ancient sites.

### The need to understand soil composition

Many ancient landscapes are obscured by modern development, making it difficult and, at times, impossible to locate important archaeological features. Surface vegetation and soil composition hold a key to what lies beneath. The presence of mud brick, for example, a common and ancient building material, has a direct effect on the soil moisture and vegetation above as it degrades.

“The high-resolution and near-infrared imagery generated by satellites like WorldView-2 detects those subtle changes to the soils where magnetometers and other traditional survey methods do not,” explains Dr. Sarah Parcak, Associate Professor of Anthropology at the University of Alabama at Birmingham. “It enhances our ability to pinpoint areas of interest that will likely require further survey and potential excavation.”

### Compare change over time

Satellite imagery allows archaeologists to quickly survey an entire site and compare changes over time.

### Company information

Dr. Sarah Parcak, a pioneer in the new field of satellite archaeology, serves as the founding director of the Laboratory for Global Observation at the University of Alabama at Birmingham, where she is an Associate Professor in the Department of Anthropology. She is also the CEO of SpectralGlobe technologies, a company that specializes in using remote sensing technologies to provide innovative landscape solutions.

PORTUS



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NATURAL COLOUR WORLDVIEW-2 IMAGE



ADJUSTED WORLDVIEW-2 IMAGE

*“Using high-resolution imagery, Normalized Difference Vegetation Index (NDVI), shape and pattern recognition, filters and imagery enhancement techniques, we identified previously unknown buildings, canals, and even the amphitheater. This project proved the utility of high-resolution multispectral satellite data in an urbanized environment, showing its great potential for archaeological discoveries at sites across the globe.”*

DR. SARAH PARCAK, CEO, SPECTRALGLOBE TECHNOLOGIES

“The imagery gives us the ability to quickly and accurately map an entire city from space,” Dr. Parcak says. “In addition, comprehensive image archives allow us to compare changes to a site over time, identifying where human interaction is a factor, as well as weather and climate change, and the changes taking place beneath the soil that are reflected on the surface.”

### Uncovering an ancient amphitheater

The archaeological site of Portus, Italy, Rome’s Imperial site, built around 114 AD, provides a powerful example of how satellite imagery can impact the discovery process. For more than 30 years, a team of researchers from Southampton University had been working the site, which now lies under a landing pattern for Rome’s Leonardo da Vinci Fiumicino Airport, using primarily ground-based technology, and had yet to discover the city’s amphitheater and other key features.

Dr. Parcak collaborated with the Southampton team, to locate the amphitheater and to identify other key archaeological features using DigitalGlobe WorldView-2 imagery in place of magnetometers and other more conventional ground-based technologies.

### Challenge

Create a cost-effective method to identify and assess archaeological sites and ancient landscapes threatened by development, human interaction, shrinking funding and changing politics.

### Solution

Unlike conventional tools, satellite imagery provides differentiation between significant archaeological features, soil, vegetation and moisture, and provides a mechanism to monitor change over time.

### Results

A research team using DigitalGlobe satellite imagery was able to identify previously unknown buildings, canals, and an amphitheater at Portus, Italy, archaeological site.

### INDUSTRY

- » Archaeology

### USES

- » Mapping
- » Cadastral
- » Elevation Data
- » Feature Extraction
- » Soil Classification

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