

Space Archaeology: Uncovering The Past



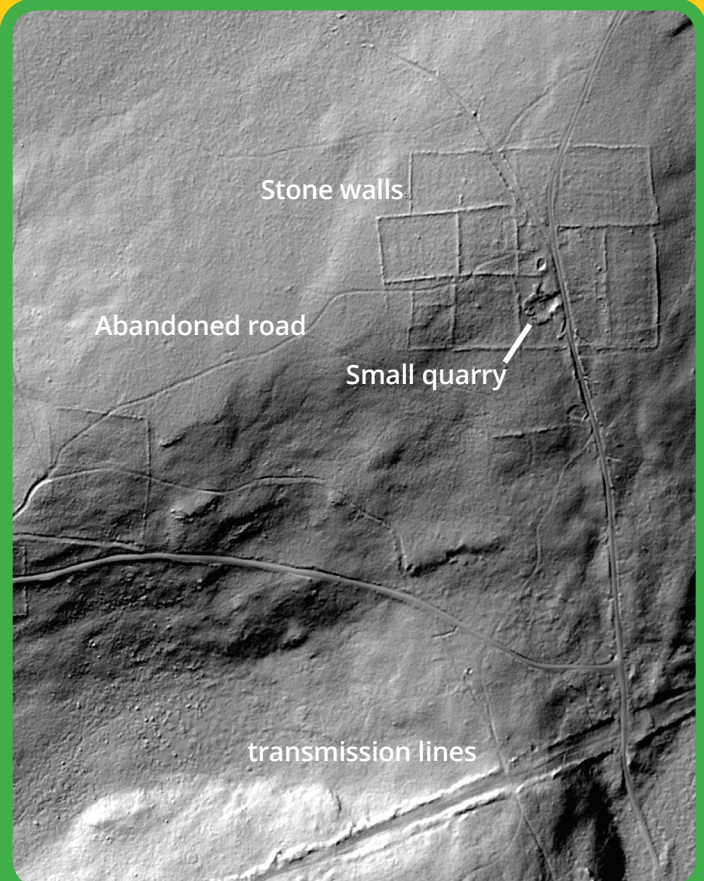
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Archaeologists uncover the past by digging through layers of civilization. Over time, sand or dirt can cover a lost city. Vines, grass, and trees can grow over an ancient town or a village. But what if you could peel back all those layers without ever taking a pick or shovel to the dirt? This is where “space archaeology” comes in. Space archaeology is exactly like it sounds: Studying the past from space.

Hidden Homestead: Lidar

This study gets a bit of help from special instruments that help us see what the eyes cannot. One such special instrument is called lidar (light detection and ranging). This system can remotely measure heights on a surface by sending pulses of laser light and measuring the time they take to bounce back to the sensor. In 2010, lidar was used to reveal an early-American homestead in Eastford, Connecticut.

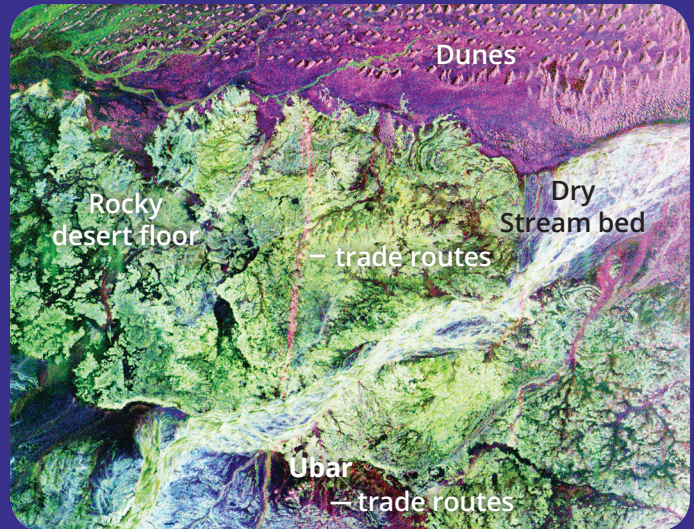
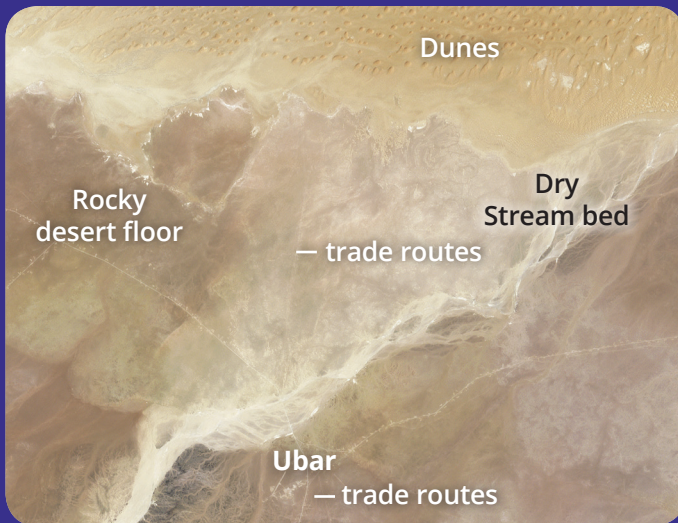
Under the trees, bushes, and grass, it is difficult to see the structures hidden underneath.



Looking at the same area with lidar uncovers evidence of old structures and roads. Archaeologists then use this information to decide whether to investigate on foot.

Lost City: Radar

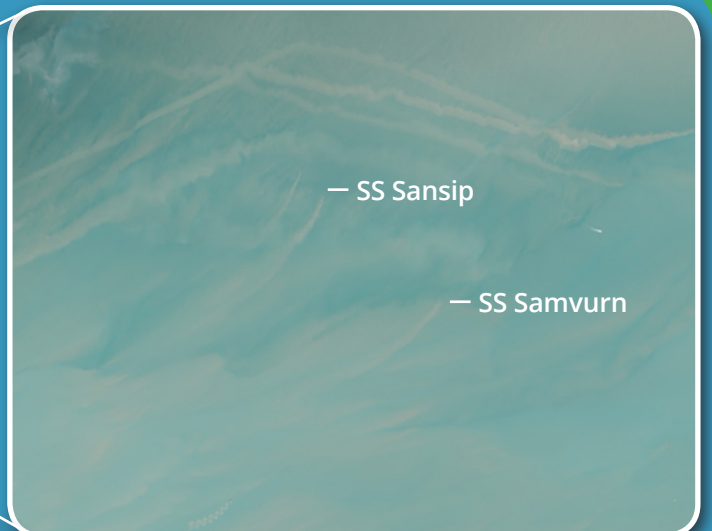
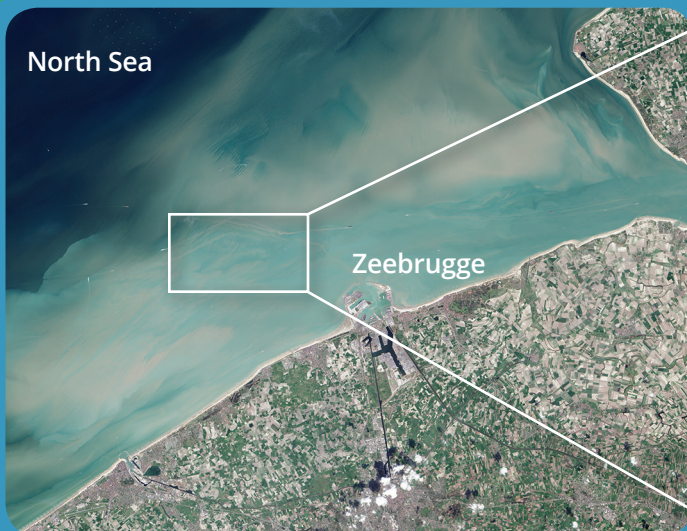
Legend has it that the Arabian city of Ubar disappeared into the sand more than 1,500 years ago. During the 1980s and 90s, pioneers of space archaeology uncovered this city with the help of radar (radio detection and ranging). This instrument sends out pulses of radio waves and then measures the return “echoes.” Radar can “see” beneath surfaces such as sand – and in this case, by as much as 10 feet (3 meters).



Sand covers this part of Oman when viewed in natural light (left), but a buried landscape is revealed by radar images (right). The different colors in the radar view reveal different textures and surfaces beneath the sand, including trade routes (pink lines) leading to ancient Ubar.

Sunken Ships: Natural Color

Even natural-color images shot from space can help find hidden structures. There are as many as 3 million shipwrecks in our oceans and, when in shallow waters, they can be dangerous for ships navigating the sea. Space archaeologists can find ships by looking for sediment plumes from space.



These two natural-color images show long sediment plumes spreading away from two known shipwrecks off the coast of Belgium: the Sansip and the Samvurn.

Responsible Space Archaeology

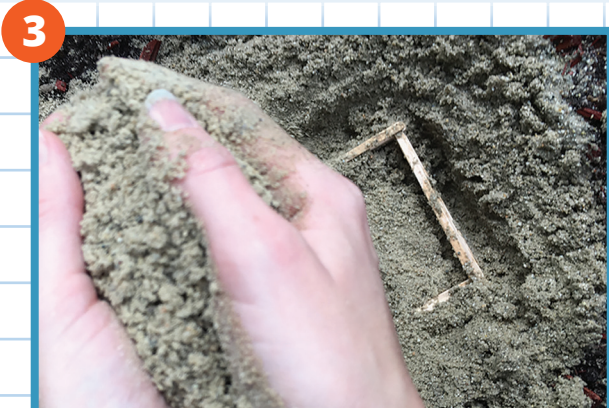
Looting has always been a problem at archaeological sites because people look for hidden treasure. It is important that people are responsible with what they learn from satellite imagery. Many ancient sites are sacred to religions and cultures; they are also important to us because they help us understand our past.

Ancient-Civilization Sandbox

With a few friends, use **remote sensing** to find the hidden structure in the sandbox.

Instructions:

1. Build a square structure by stacking and gluing the popsicle sticks. Set aside.
2. Wet and mix the sand in the sandbox.
3. Hide the structure by digging a shallow hole and putting it inside. Then, fill the center of the structure with wet sand and sprinkle the entire area lightly with dry sand until the structure is hidden.



What do you see? Your eyes, just like satellites, are viewing a landscape from above. Space archaeologists use advanced instruments to help define what they see in satellite imagery.

4. Bring your friends in to view your landscape, but be sure to keep it secret where the structure is hidden.
5. Sprinkle the entire area with water until wet and let the water settle.

Materials:

- Glue
- Water
- Dry play sand
- 24 Popsicle sticks
- One or two friends
- Digital camera/smartphone
- Sandbox with drainage holes
- Watering can with sprinkler spout



6. Ask your friends to take a picture of the surface. Use the image editing tools on your smartphone or computer to affect the lighting, color, and contrast. Try converting the image to black and white, or use other filters.
7. Using your friend's **remote sensing** knowledge, have them pick one spot as a dig site. Did they find anything?

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Can you make out any shapes in the sand in your photograph? What do the shapes tell you could be underneath the surface? Where should you dig?



Vocabulary:

Remote sensing - To obtain information about an area while observing from a distance.



Find it with Filters

Can you spot the sandbox civilization?

Satellites can measure different wavelengths of light. Scientists create images by assigning different colors to each type of light, like a filter in your camera, to make objects stand out.



Natural color



Black and white



Negative filter