

Fly with  
**Dana**  
over the  
Past



Created for the ISAC Museum special exhibition  
*Pioneers of the Sky: Aerial Archaeology and the Black Desert*  
(April 25–August 18, 2024, <https://isac.uchicago.edu/pioneers-sky>)  
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# Fly with **Dana** over the **Past**



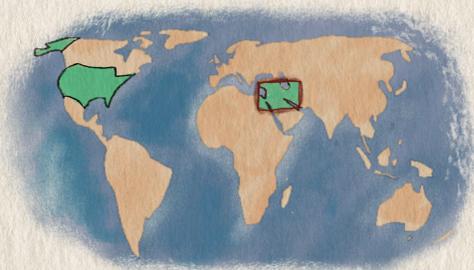
**ISAC**  
MUSEUM

**The goal of archaeology** is to understand the past by studying the material traces and objects that people left behind. While most archaeological work is done on the ground, we can also study the past from the sky. This is called aerial archaeology.

Today, **aerial archaeology** is mostly done by examining images of the Earth taken from cameras attached to kites, balloons, and drones. Airplanes, helicopters, and satellites in space are used to take aerial images from even higher altitudes. In these images, ancient houses, cities, roads, and farms look very different from modern features, such as your home, school, and nearby roads.

Archaeologists not only identify these types of ancient features in aerial images but can also use them to recognize patterns and create maps of the ancient landscape. They can also visit these ancient features on the ground to better understand what they are, how they were built, and when they were used. If they just look at what is visible on the ground, it is called a *survey*. If they dig to uncover what is buried underground, it is called an *excavation*. The objects displayed in the ISAC Museum were found by archaeologists through both survey and excavation.

**Meet Dana**, a young landscape archaeologist in West Asia! She studies how people lived in the past. She will tell you about the history of aerial archaeology, which began over 100 years ago! Follow her to learn about the technique and cool flying devices used in aerial archaeology and how to understand aerial images. If you find a word you don't know, see if its explanation is in the Glossary on page 13.



# Timeline

## Aerial Archaeology in West Asia

### 1914–1918

During World War I, airplane pilots took aerial photographs for military purposes, revealing the value of these photographs for discovering ancient landscapes and for the discipline of archaeology as a whole.

### 1920s–1930s

From 1929 to 1935, **P. L. O. Guy** used a camera attached to a **balloon** to take photographs of the ancient city of Megiddo (Tell el-Mutesellim), in present-day Israel.



A. Poidebard in Syria (1925–1932) and **E. F. Schmidt** in Iran, including the Persepolis plain (1935–1937), took thousands of photographs of ancient landscapes from airplanes for archaeological studies.

### 1960s–1970s

During the Cold War, spy satellites, such as US CORONA satellites (1960–1972), took hundreds of thousands of aerial images over West Asia for military purposes.

Access to these images was restricted to military personnel and special agencies.

In 1967, R. McC. Adams used kites to take aerial photographs from low altitudes near the ancient city of Uruk (Warka), in present-day Iraq. Cheap and easy to manipulate, kites came to be used widely by archaeologists in the following decades.

### 1990s–2000s

Advancements in computer technologies increased the speed and ease with which aerial photography was used and processed.

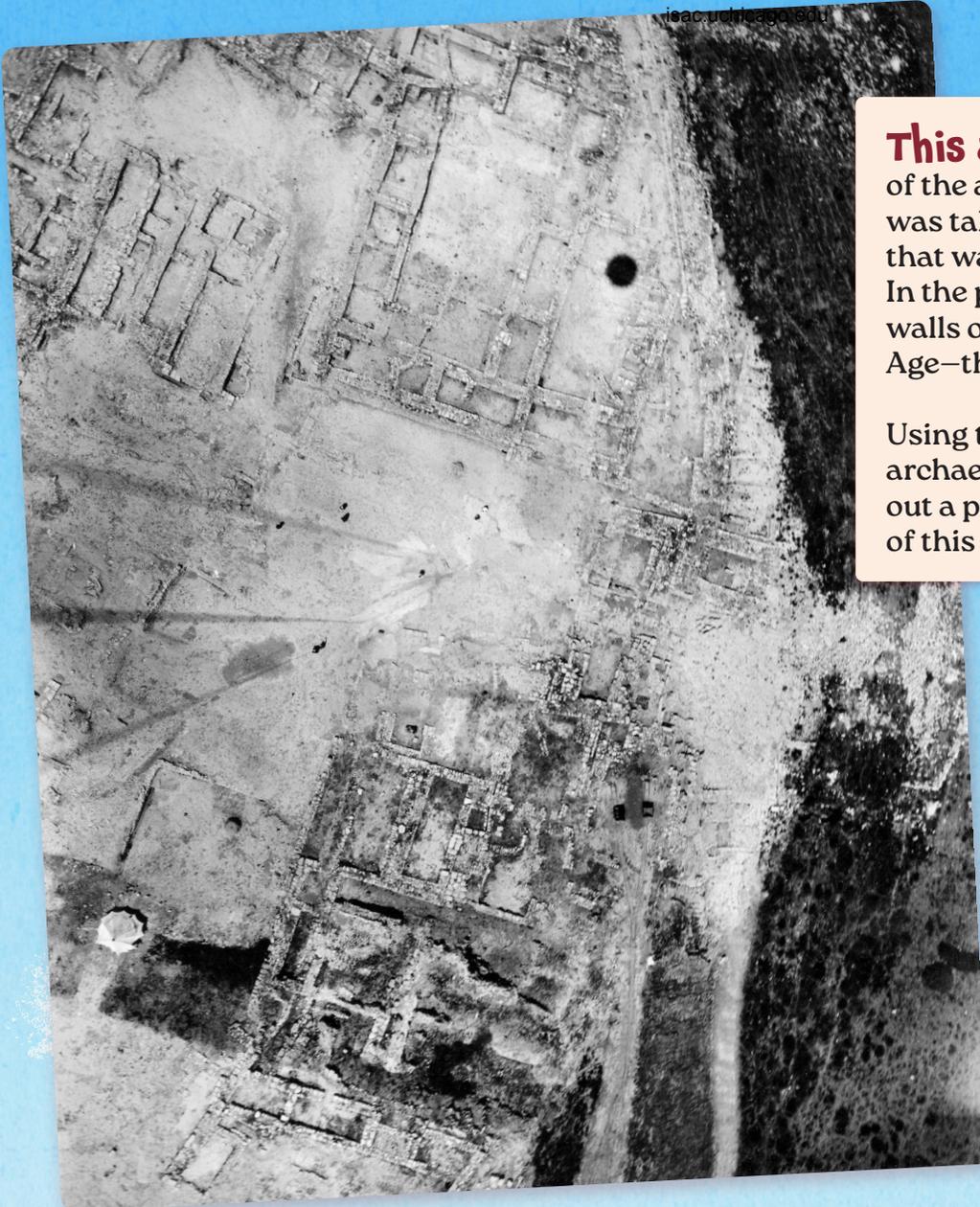
In 1995, CORONA images were declassified, making them accessible to the public. This collection of images allowed archaeologists to discover ancient landscapes at a regional scale and to identify ancient features that are no longer visible on the ground.

The release of Google Earth in 2005 gave anyone with internet access the ability to see images of the entire world as captured from satellites.

### 2010–Present

Since 2013, **drones have been used to take aerial photographs** and videos of the Black Desert in eastern Jordan. Digital technologies now lead the way in aerial archaeology, mapping the future of this discipline that continues to push the boundaries for our understanding of the past.

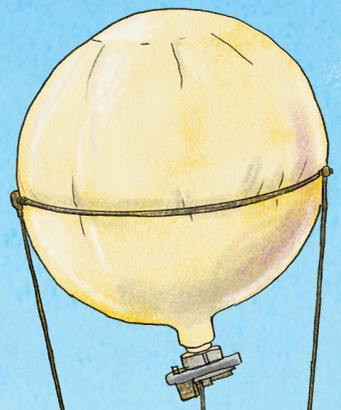




**This aerial photograph** of the ancient city of Megiddo was taken in 1931 from a camera that was attached to a balloon. In the photo you can see stone walls of buildings from the Iron Age—that's over 2,500 years ago!

Using these pictures, archaeologists can map out a plan of the buildings of this ancient city.

Because the balloon was flying so high when it took this photograph, the archaeologists in the center of the photo look as small as ants. Can you also find the white tent and the black shadow of the balloon?



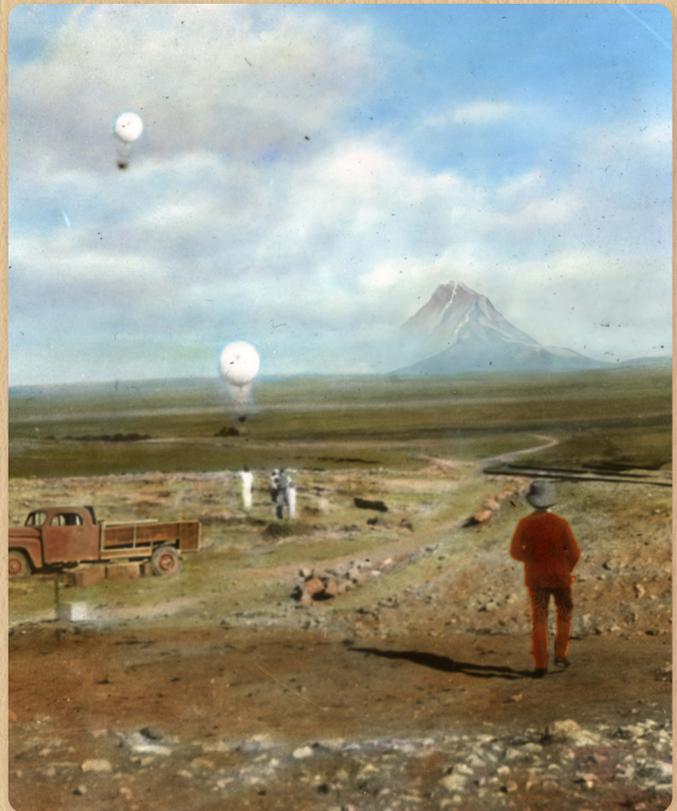


**This picture** shows the balloon that was flown over Megiddo for the first time in 1929. You can also see some of the expedition members watching this special event. The photograph was taken using black-and-white film and was printed on photo paper. Color photographs were rare 100 years ago!

Like several other photographs of Megiddo, this one was also printed on a transparent glass plate. When you shine light through the plate, the image that is projected onto the opposite wall or screen appears much larger. Back then this was done with a “magic lantern”—much like digital projectors today. **The image below** shows this slide with color added to it. This was done by hand by members of the expedition.



Find **5** differences!



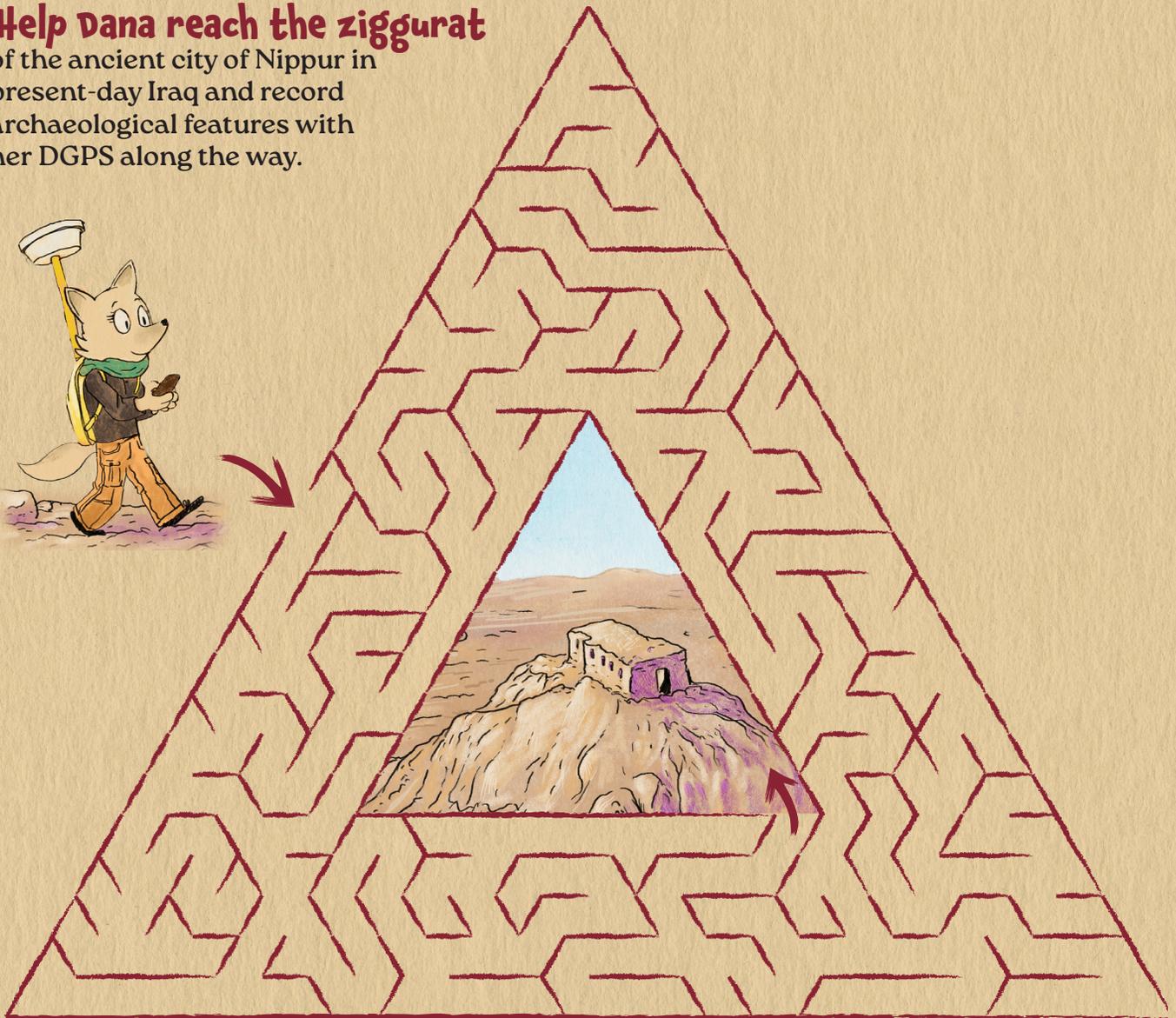
# Color Dana and her airplane in front of the ancient city of Persepolis!



Founded by King Darius I around 520 BCE, Persepolis was one of the greatest cities of the Achaemenid Empire. The empire's heartland was ancient Persia, what is today the country of Iran.

## Help Dana reach the ziggurat

of the ancient city of Nippur in present-day Iraq and record archaeological features with her DGPS along the way.

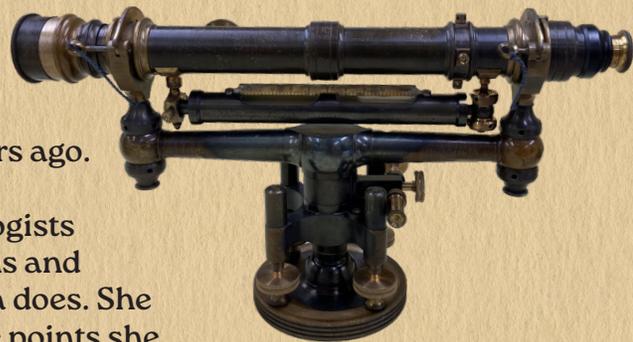


All archaeological features have a location on the Earth—think about where your home is located along a street. They also have an elevation, which means their height above sea level. Both the location and elevation of an archaeological feature can be recorded using special equipment called a topographic device.

Theodolites and levels, **like the level on the right from 1910**, are two kinds of topographic devices;

they were first invented around 200 years ago.

Today archaeologists use total stations and DGPS, like Dana does. She can connect the points she records on the ground with aerial imagery. Since the 1990s, topographic recording, aerial photographs, and any other spatial data can be processed for mapping and analysis using GIS software.



Today archaeologists like to use **drones** to take aerial photographs. Drones are easy to control. They can also fly at different heights, from a few inches above the ground up to 400 feet—a common legal limit. Drones can also carry cameras that can take thousands of photographs, as well as videos. These images can then be used to produce digital drawings, maps, and 3D models of archaeological features and landscapes.



**This aerial photograph** of a Neolithic stone structure, built more than 8,000 years ago, was taken with a drone in the Black Desert of Jordan.

Which famous character does this shape remind you of?



Because images of the Earth taken from **satellites** show such wide views of the planet, they are very helpful for landscape archaeology. Sometimes satellite images taken decades ago show ancient features that are no longer visible in the landscape.



**These two satellite images** are of the archaeological site of Tell Brak and its surroundings. This was the location of the ancient city of Nagar during the Early Bronze Age (third millennium BCE) in present-day Syria.

**In the black-and-white image**, taken in 1969 from a CORONA satellite, you can see the roads and walkways of the ancient city—the grey lines radiating around the site.

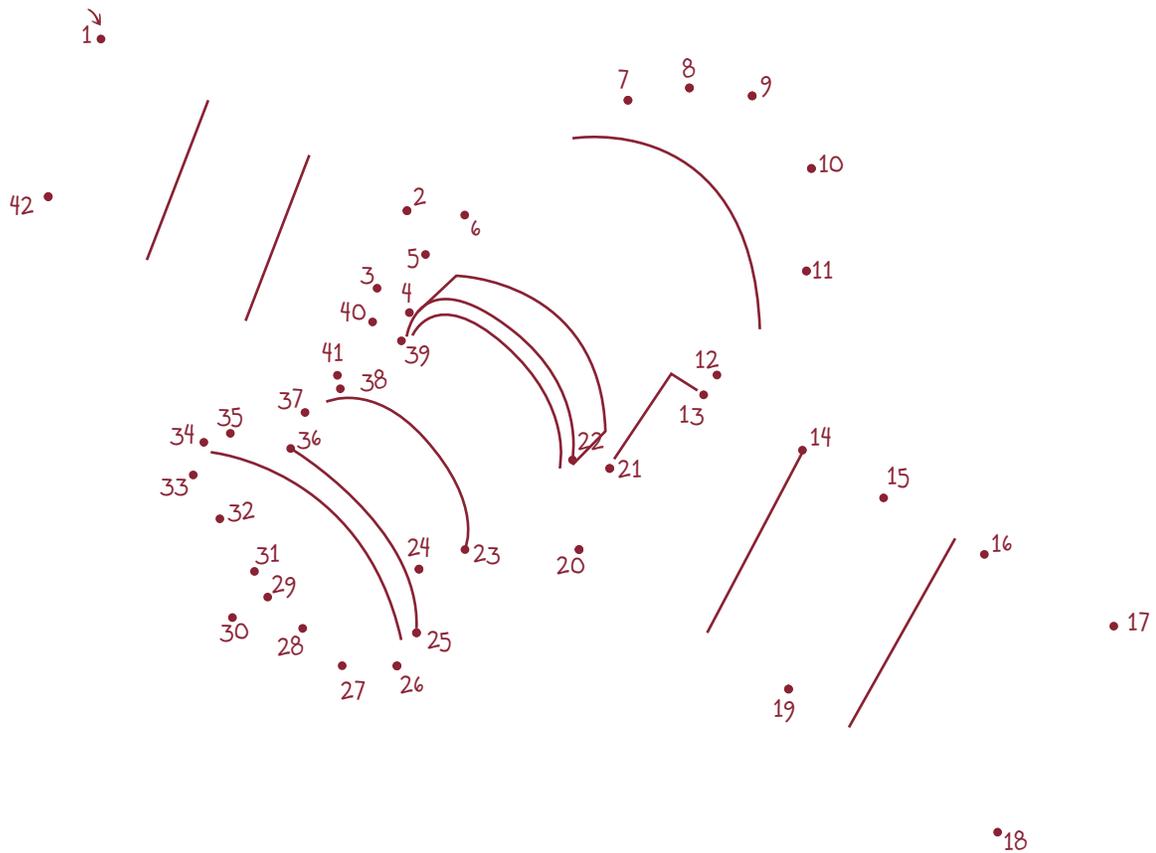


**In the color image**, available in 2024 in Google Earth, you can barely see these ancient routes. Can you see other changes in the landscape, like new roads (in white) and settlements (villages, towns) that have grown in size, similar to the example circled in maroon?

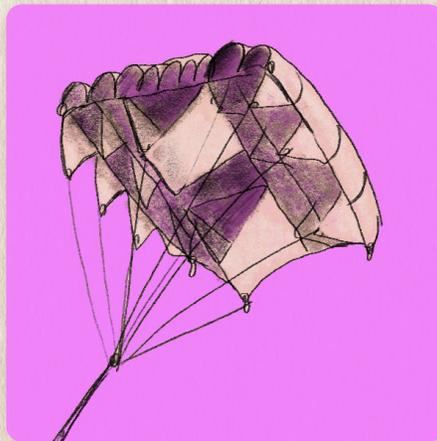
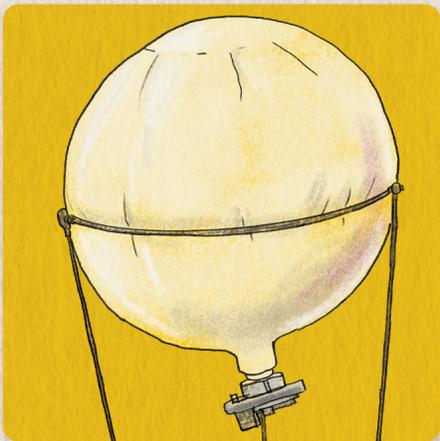
Practice reading aerial images by looking for differences between these two images.



## Connect the dots and find out what a satellite looks like.



## Can you name these flying devices?



(Megiddo, 1929)

(Uruk, 1967)

(Black Desert, 2013)

**Draw your favorite flying device and help Dana take aerial photographs!**



# Glossary



## Historical background

(in chronological order)

**Neolithic** The Neolithic period began more than 12,000 years ago in West Asia, long before the invention of writing and the use of metals. People made tools out of stone and invented pottery, made out of clay. Small groups of hunter-gatherers, who moved according to the seasons in search of food and water, started to gather in larger groups and to settle in villages year-round. They also started to grow crops and breed animals.

**Early Bronze Age** The Bronze Age lasted from 3,300 to 1,200 BCE in West Asia. This period saw advances in writing systems and the rise of cities. Archaeologists divide this period into three smaller time periods: the Early Bronze Age, the Middle Bronze Age, and the Late Bronze Age.

**Ziggurat** This was a type of massive stepped structure built in major cities of ancient West Asia, beginning in the Bronze Age up to the Iron Age. It had a temple on the top and was dedicated to a god or goddess.

**Iron Age** The Iron Age is the period between the collapse of the societies of the Bronze Age, around 1,200 BCE, and the beginning of the Achaemenid Empire, around 550 BCE.

**Achaemenid Empire** This empire, which ruled from 550 to 330 BCE, was the largest at that point in history. Its heartland was in Persia (present-day Iran), but at its greatest extent it controlled all of West Asia, as well as parts of Europe, North Africa, Central Asia, and South Asia.

**Cold War** This was a period of political tension between the United States and the former Soviet Union (a very large country that spanned much of Eastern Europe and Asia) that lasted from 1947 to 1991.

## Technical terms

(in alphabetic order)

**DGPS** (Differential Global Positioning System) GPS is a system of satellites and equipment that receive information from satellites, such as Dana's yellow and white device. This technology works together to give the location of something on the Earth's surface. The equipment calculates a thing's location using the radio signals that are transmitted by satellites. Differential GPS is an advanced version of this system: it provides a stronger signal and more accurate location information.

**GIS** (geographic information system) A GIS is a computer-based system or tool for displaying and analyzing data related to the location of things on the Earth. This data can be of different types, including data recorded on the ground with a DGPS and aerial images.

**Satellite** A satellite is anything that moves in a circular path around a larger object. This path is called an orbit. The Moon and many human-made devices orbit the Earth. Some of these devices take images of the Earth. Anyone can look at satellite images online using Google Earth, NASA's Earth Observatory website, and the CORONA Atlas of the Middle East.

**3D model** This is a three-dimensional copy of an object. A photograph of an object is only two-dimensional. The three dimensions of any object include its length, width, and height. Nearly every object we see in our day-to-day lives has a three-dimensional shape. 3D models are especially helpful to archaeologists when they don't have access to the original objects.



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