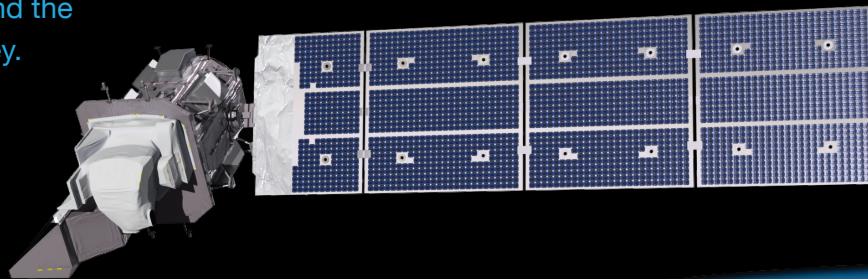


# LANDSAT NINE

For nearly 50 years, Landsat satellites have shown us our home planet from space. With the launch of Landsat 9, the mission will continue collecting data on Earth's forests, farms, cities and freshwater regions — the longest satellite record of its kind.

Since the launch of the first Landsat satellite in 1972, the mission's archive has grown to contain more than 8 million images. Landsat 9 data will add to this archive to better our understanding of Earth in innumerable ways – from tracking water use in crop fields in the western United States, to monitoring deforestation in the Amazon rainforest, to measuring the speed of Antarctic glaciers. Decision makers from across the globe use the freely available Landsat data to better understand environmental change, forecast global crop production, respond to natural disasters, and more. The usefulness of the data stems from the careful design and engineering of the satellite and the mission.

As Landsat 9 orbits Earth, it captures scenes across a swath 185 kilometers (115) miles wide. Each pixel in these images is 30 meters across, or about the size of a baseball infield, which allows resource managers to resolve most crop fields in the United States. Its instruments collect images of Earth's landscapes in visible, near- and shortwave (reflected) infrared, and thermal infrared wavelengths. Like its predecessors, Landsat 9 is a joint effort of NASA and the U.S. Geological Survey.



NASAfacts

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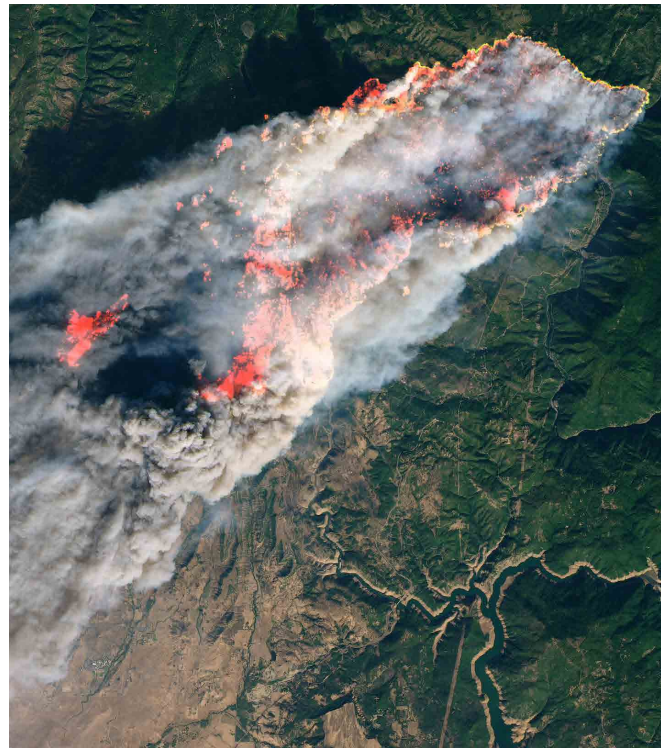
Landsat 9 carries two instruments: the Operational Land Imager 2 (OLI-2) and the Thermal Infrared Sensor 2 (TIRS-2). Both replicate instruments onboard Landsat 8, which launched in February 2013, and both have a five-year design life.

OLI-2, built by Ball Aerospace, is a multispectral instrument, imaging in visible, near infrared and shortwave infrared light. Several of these bands replicate the wavelengths detected by previous Landsat imagers – allowing Landsat 9 to maintain continuity with decades of previous Landsat observations. Two new bands were introduced with the Landsat 8 OLI, one that detects cirrus clouds and one that has improved observations of coastal waters and aerosols. Landsat 9 will downlink 14-bit data from OLI-2, as compared with 12-bit data from OLI, leading to improved observations of darker regions, such as coastal waters.

Earth's surface emits heat, at rates proportional to its temperature. TIRS-2, built by NASA's Goddard Space Flight Center in Maryland, detects emitted radiation in two thermal infrared wavelengths using a technology called Quantum Well Infrared Photoreceptors, or QWIPS. Temperatures derived from these measurements can be used to calculate the amount of soil moisture and detect the health of plants by tracking the rates of evapotranspiration. Scientists use the Landsat 8 TIRS for monitoring phenomena as varied as irrigation use and ice sheets calving into icebergs. TIRS-2 improves on the original TIRS instrument by correcting an issue with stray light reaching the focal plane, and by upgrading the design life to 5 years by adding redundancy to key components.



*Engineers inspect the TIRS-2 instrument in the clean room at NASA's Goddard Space Flight Center in Greenbelt, Maryland.*



*The Operational Land Imager on Landsat 8 captured this image of the Camp Fire on Nov. 9, 2018, as it burned the community of Paradise, California. Landsat data enables land managers and scientists to assess the severity and extent of large fires such as this one.*

## Quickfacts

### **Mission Management and Operations:**

NASA's Goddard Space Flight Center manages the development of Landsat 9 through its launch and post-launch checkout. The U.S. Geological Survey operates the satellite and manages the data archive

### **Spacecraft Provider and Observatory Integration:**

Northrop Grumman Innovation Systems

**Orbit Altitude:** 438 miles (705 kilometers)

**Orbit Duration:** 99 minutes

**Orbits per Day:** 14

**Images per Day:** 700+

**Coverage of Earth:** Every 16 days

**Launch Vehicle:** United Launch Alliance Atlas V 401 rocket

**Launch Site:** Vandenberg Air Force Base, California