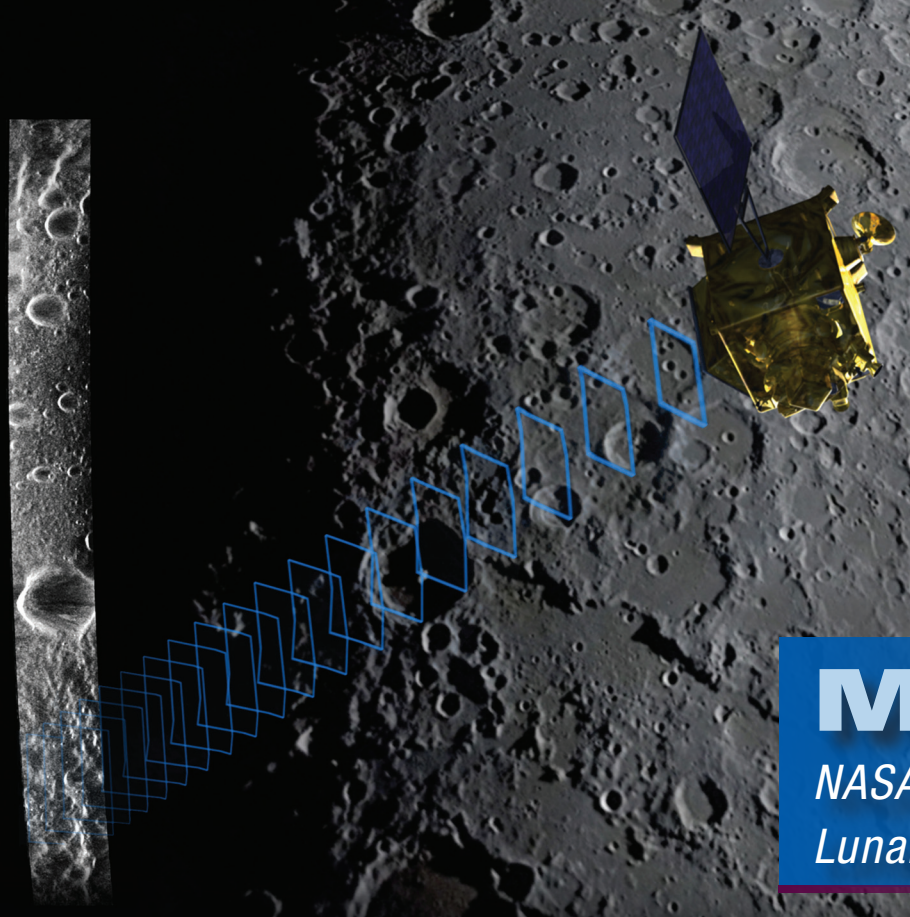
National Aeronautics and Space Administration



Mini-RF

NASA's Next Leap in Lunar Exploration

Above, an artist's rendition of the Indian Space Research Organisation's Chandrayaan-1 lunar orbiter, with the Mini-RF (Mini-SAR) instrument gathering data on the Moon's shadowed polar regions.

Four decades after humankind's first giant leap, NASA is returning to the Moon in a big way with the Mini-RF project, which is flying two radar instruments to map the lunar poles, search for water ice, and to demonstrate new communications technologies.

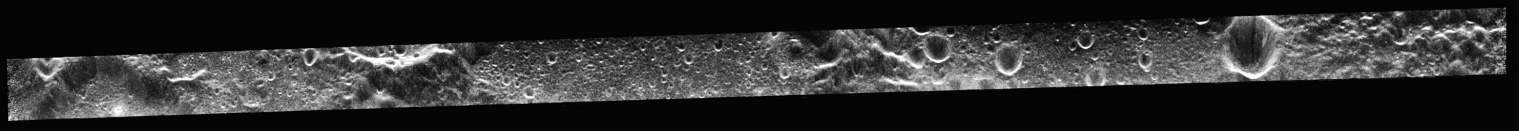
An innovative synthetic aperture radar (SAR), the instrument will orbit the Moon on two platforms: the Indian Space Research Organisation's Chandrayaan-1 spacecraft and NASA's Lunar Reconnaissance Orbiter. What it finds will support humans' return to the Moon.

New Technology

Mini-RF stands for Miniature Radio Frequency. Based on new technology, this powerful scientific instrument (also known as Mini-SAR) consists of an antenna and electronics boxes. The combined mass of the Mini-SAR components on Chandrayaan-1 is about 19 pounds (9 kilograms), while the Mini-RF package on the Lunar Reconnaissance Orbiter weighs approximately 29 pounds (14 kilograms).

Exploration Potential

Mini-RF focuses on the lunar poles, mysterious and relatively unexplored regions that preserve materials from the early history and evolution of the solar system. These regions also have significant exploration potential, having been chosen as the location of the next human lunar mission. If Mini-RF locates ice deposits, these resources could be used by future lunar explorers.



Above, a strip of Mini-RF data that images the Peary and Byrd impact craters near the Moon's north pole. The floors of some of the smaller craters never see the Sun and are being viewed, using radar, for the first time.

www.nasa.gov

Mini-RF

Exploring the Lunar Poles

Over the last few decades, scientists have found the lunar poles to be unique and interesting environments – but they are still relatively unknown, "luna incognita." Mini-RF data will greatly advance our understanding of these regions, giving scientists their first look inside the Moon's coldest, darkest craters, and producing images of areas that never receive sunlight and aren't visible from Earth.

The Chandrayaan-1 Mini-SAR collects strips of data 5 miles (8 kilometers) wide by up to 290 miles (460 kilometers) long. Polar mosaics – combining hundreds of individual image strips – cover areas from 80° latitude to each pole, an area of more than 100,000 square miles. Using its advanced capabilities to investigate suspected ice deposits, the Mini-RF on the Lunar Reconnaissance Orbiter will make targeted observations of potentially significant areas spotted by Mini-SAR on Chandrayaan-1.

Simultaneous Observations

Chandrayaan-1, India's first mission to the Moon, is mapping the lunar surface for two years from a 62-mile (100-kilometer) circular polar orbit. Mini-SAR is one of two NASA contributions to its 11-instrument Indian and international science payload.

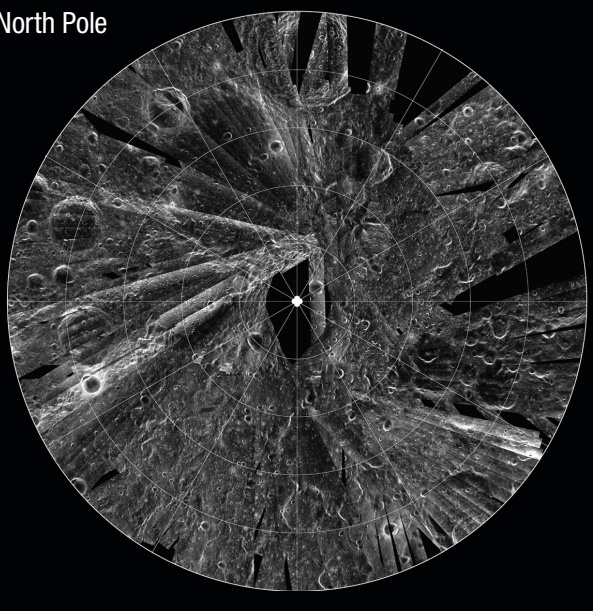
Lunar Reconnaissance Orbiter, carrying Mini-RF and six other instruments, will map the Moon for one year from a 31-mile (50-kilometer) circular polar orbit. Mini-RF is an enhanced version of its cousin on Chandrayaan-1, able to communicate in both S-band (like Chandrayaan-1) and X-band frequencies. Its "zoom" feature allows it to image details smaller than 100 feet (30 meters) across. Mini-RF will also test new communications technology.

Artist's rendition of NASA's Lunar Reconnaissance Orbiter over the lunar surface, with the Mini-RF antenna attached to its Moon-facing panel.

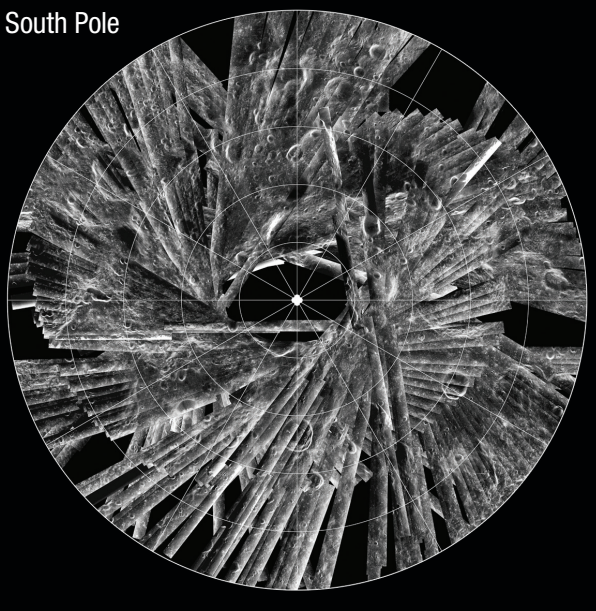
Mini-RF has been designed, built and tested by a team that spans the entire United States. The Johns Hopkins University Applied Physics Laboratory (APL) performed the final integration and testing on both instruments; they were developed and built by the Naval Air Warfare Center and several other commercial and government contributors, including Sandia National Laboratories, Raytheon and Northrop Grumman. The Satellite Communications Facility on APL's Maryland campus serves as Chandrayaan-1's primary ground station in the Western Hemisphere. Instrument principal investigators are Paul Spudis (Mini-SAR), from the Lunar and Planetary Institute, and Ben Bussey (Mini-RF), from the Johns Hopkins University Applied Physics Laboratory.

To learn more about Mini-RF, visit www.nasa.gov/mini-rf.

North Pole



South Pole



Lunar-polar mosaics showing data collected by Mini-RF during its first imaging season. The mosaics cover within 10° latitude of each pole.