

# LUNAR COMPACT INFRARED IMAGING SYSTEM



On a mission to uncover secrets of the Moon's surface, the Lunar Compact Infrared Imaging System (L-CIRiS) instrument will map mineral composition and temperature in previously unseen detail – all from a package that can be carried by a lander or rover.



*Credit: NASA*

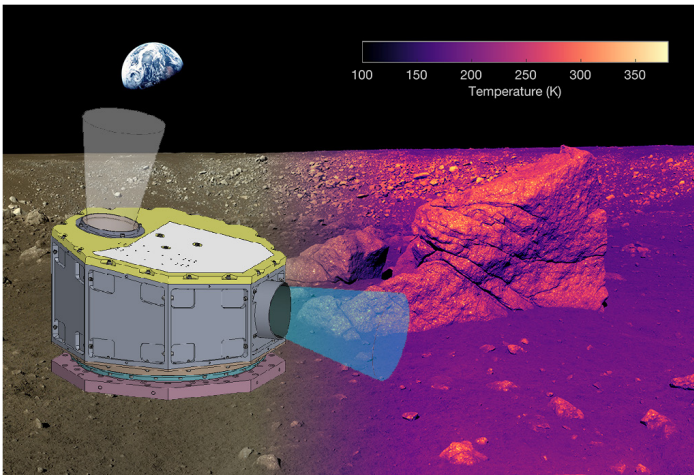
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## Overview

Ball Aerospace is building the L-CIRiS instrument for the NASA Lunar Discovery and Exploration Program (LDEP) to study the mineral composition, temperature and other surface and sub-surface characteristics of the Moon. L-CIRiS will be a payload aboard a robotic moon lander to be provided through NASA's Commercial Lunar Payload Services (CLPS) initiative.

A multispectral infrared imaging radiometer, L-CIRiS will produce images in the infrared region of the electromagnetic spectrum. Further processing will yield temperature and mineral composition maps, with the capability to reveal features at never-before-seen scales at less than 1 cm across. Data from L-CIRiS will support lunar geological studies, as well as preparation for future lander, rover and astronaut missions by determining the density and compactness of lunar soil.

As a candidate for landing near the lunar South Pole, L-CIRiS will potentially go where no astronaut has been before. Here L-CIRiS will map out cold pockets and shadows in the south polar region where it is believed ice deposits may be trapped. Finding ice on the Moon is for In-Situ Resource Utilization (ISRU) potential and will support future mining, manufacturing and long-term infrastructure.



*A false-coloring simulation of the L-CIRiS's infrared camera capturing temperature and mineral details of the Moon's surface.*

## Quick Facts

- L-CIRiS will acquire infrared images through panoramic scans of the lunar surface from its mounting location on the outside of a lunar lander.
- Among the scientific questions that L-CIRiS data may help answer is: how did the Moon form?
- The capabilities of L-CIRiS are applicable to studies of other planetary bodies, including Mars, asteroids, comets and the moons of other planets.
- L-CIRiS is candidate for going to the lunar south pole, an area that has not been visited before by astronauts or instruments

## Our Role

Leveraging more than 40 years of expertise in developing highly calibrated instruments, Ball Aerospace built the L-CIRiS instrument under a subcontract to the University of Colorado, Boulder.

The L-CIRiS design is an adaptation of the Ball-built CIRiS instrument. CIRiS, which was launched in 2019 to low earth orbit, and L-CIRiS incorporate miniaturized, high performance, on-board calibration systems that greatly increase the scientific value of the data they acquire. L-CIRiS uses flat panel substrates coated with exceptionally high emissivity coatings to achieve high calibration accuracy in a very small volume. The overall instrument design has been optimized for operation with an uncooled infrared microbolometer focal plane array, eliminating the need for the cryocooler required by many other infrared detector types. Features of L-CIRiS specifically added for lunar operation include a mechanism for panoramic scanning of the lunar scene and an enclosure to regulate the instrument's temperature while on the Moon.

