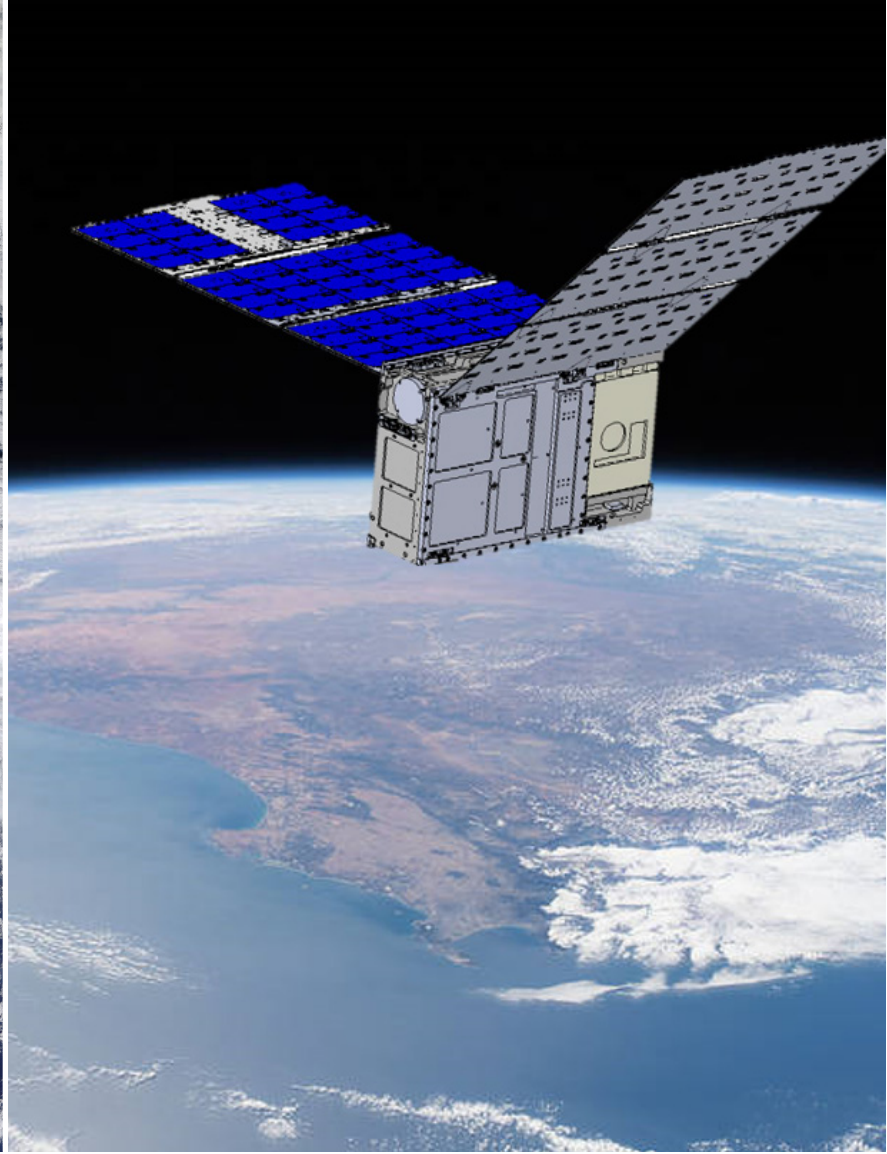
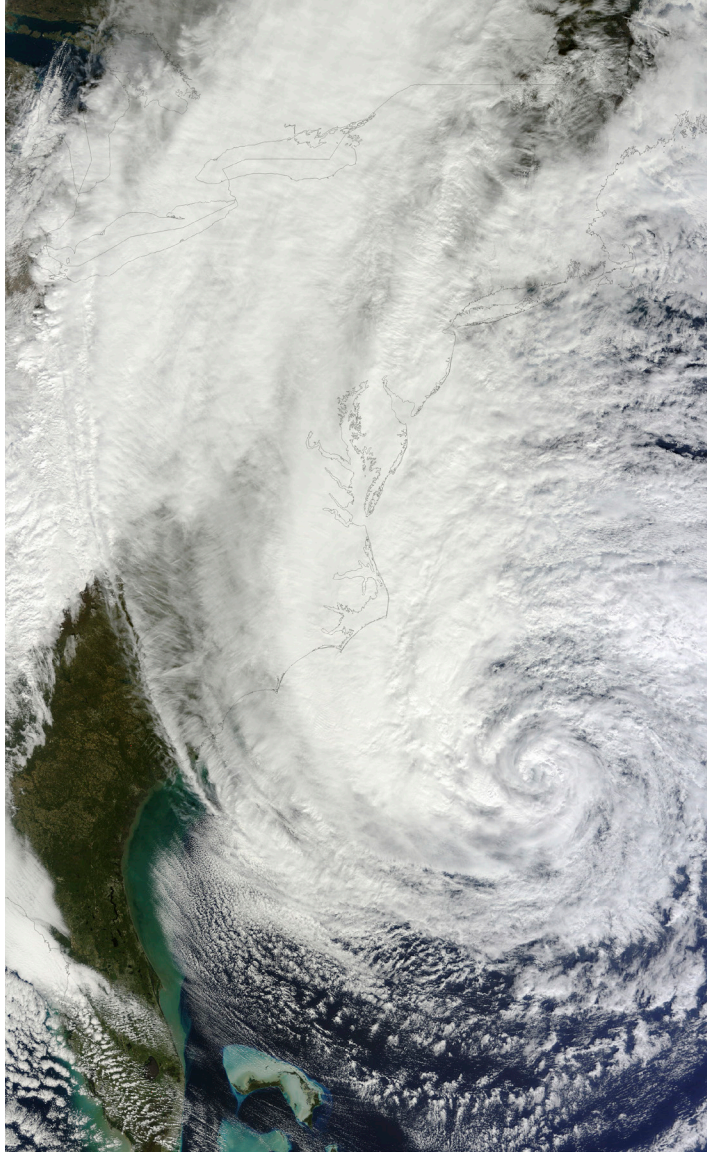


COMPACT INFRARED RADIOMETER IN SPACE



GO BEYOND WITH BALL.®

Small but mighty, the highly calibrated Compact Infrared Radiometer in Space (CIRiS) instrument will observe Earth from a spacecraft no larger than a shoebox. With optimized spacecraft and instrument technology, CIRiS provides maximum science return in a compact unit.

OVERVIEW

Ball Aerospace is building the CIRiS instrument, funded by the NASA INVEST (In space Validation of Earth Science Technology) program. Weighing only 1.8 kg (3.6 lb), CIRiS will demonstrate the ability of new cubesat-compatible, miniaturized instruments to return highly-calibrated, scientifically-significant data, enabling Earth observation for scientific applications.

CIRiS utilizes new technologies to achieve high on-orbit calibration performance in a much smaller volume than previous infrared imaging payloads. An improved uncooled infrared microbolometer detector produces 640 x 480-pixel images and fits together with its own electronics in a volume less than 1.5 x 3 inches. This eliminates the need for a cryocooler, as required by other infrared detectors. For on-orbit calibration, CIRiS carries two flat-panel carbon nanotube sources that replace the much bulkier alternative, with performance that equals or exceeds the older technology. CIRiS will collect highly calibrated infrared images of the earth and atmosphere. The processed data may be converted to images of land and ocean surface temperatures, conditions inside clouds and soil moisture. This data will help scientists better understand cloud phenomena and conditions prior to extreme storms and generate maps to show variations in drought and moisture across land.

OUR ROLE

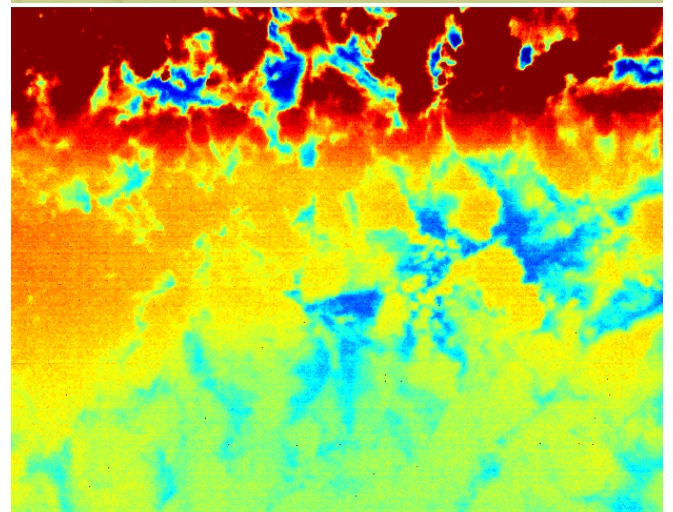
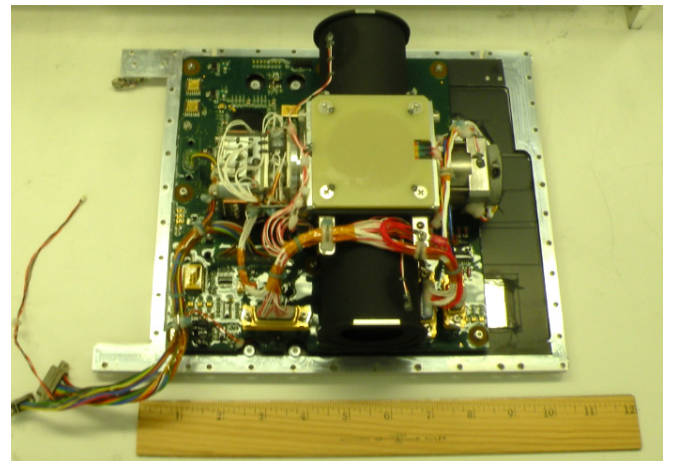
CIRiS leverages Ball's more than 40 years of expertise in developing highly-calibrated instruments for environmental monitoring. The CIRiS instrument is based on the Ball Experimental Sea Surface Temperature (BESST) radiometer, which has provided critical data on sea surface temperatures and disasters, such as the 2010 Gulf Oil spill.

Ball designed and built the CIRiS instrument and will integrate it into a cubesat spacecraft. We will conduct mission operations with the aid of Space Dynamics Laboratory. Ground and on-orbit data will be analyzed and stored by Ball for future applications. The mission launched in 2019 to the International Space Station.

QUICK FACTS

- The CIRiS instrument will operate on a 6U cubesat in low Earth orbit
- CIRiS generates parallel images in three different "thermal infrared" wavelength bands
- CIRiS is the first mission to use an uncooled microbolometer infrared focal plane array (for imaging) and carbon nanotube blackbody sources (for calibration) together
- CIRiS has three calibration views, including one view to deep space, which may be selected in any order when on orbit

The CIRiS instrument outside of the cubesat spacecraft



A CIRiS image of clouds off the Australian coast