

CICERO

Community Initiative for Continuous Earth Remote Observation



(Courtesy LASP/NASA)

The CICERO constellation of satellites will use remote-sensing equipment to study the Earth's atmosphere and analyze climate changes.

Processes within Earth's atmosphere control hazardous weather events such as hurricanes and droughts, and contribute to climate change. The remote sensing satellites that make up the Community Initiative for Continuous Earth Remote Observation (CICERO) mission will collect critical atmospheric data to study the weather systems and climate changes that directly affect society. This data will:

- Enhance weather and climate forecasts
- Help monitor violent space weather events
- Improve understanding of fundamental atmospheric processes
- Help scientists and policymakers mitigate the potential hazards of extreme Earth and space weather

CICERO data will include:

- High-accuracy measurements of pressure, temperature, and moisture in Earth's atmosphere
- Three-dimensional maps of the electron distribution within the ionosphere—the region of Earth's atmosphere that generates the aurora and where hazardous geomagnetic storms occur
- Profiles of ocean and ice properties that are integral to Earth's climate system

At the Cost-Cutting Edge of Science

CICERO is designed to reduce the cost of traditional atmospheric data collection by employing an array of low-cost, high-performance remote sensing devices. The mission will

Quick Facts

Launch date: October 2014

Launch location: TBD

Mission target: Low-Earth orbit

Primary duration: One year minimum, seven years nominal

Project description: CICERO will provide Earth climate and weather forecasting data using a constellation of remote sensing satellites.

LASP will provide:

- Principal Investigator Mike McGrath
- Spacecraft bus
- Mission operations
- Management for the mission and control of the spacecraft after launch

Primary sponsor: GeoOptics

Other organizations involved:

- | | |
|------------|------------------------------|
| • First RF | • DoD |
| • UCAR | • USAF |
| • NASA JPL | • USN |
| • NOAA | • University of North Dakota |

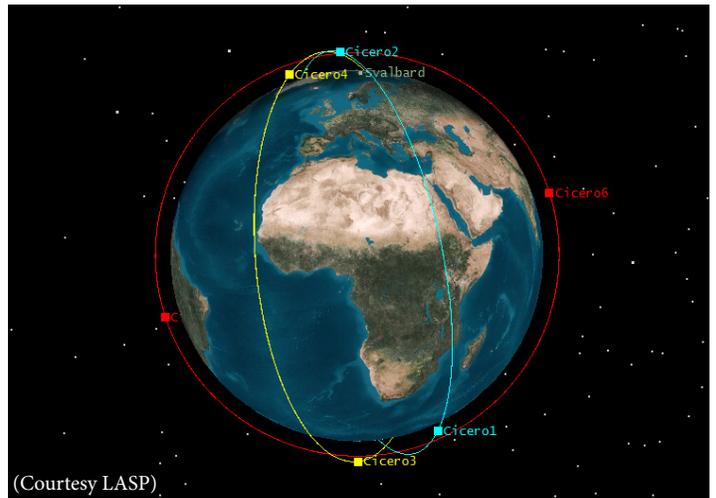
consist of a network of small spacecraft in low-Earth orbit, each carrying a compact GPS Radio Occultation (GPS-RO) sensor that measures refracted signals to determine properties of the atmosphere.

- Each spacecraft will be dedicated to one purpose, thereby maintaining a simple and cost-effective design.
- The first network of six satellites will be launched over a two-year period, with the first spacecraft slated for launch in 2014.

LASP Contributes its Engineering Capabilities

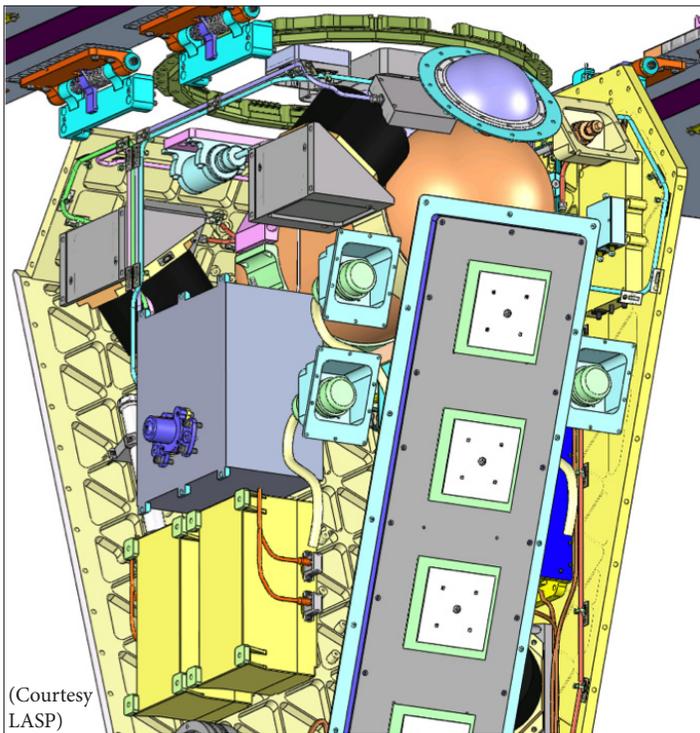
The LASP Engineering Division conceives and develops space instruments and components, which are manufactured, assembled, tested, and calibrated on-site. The proximity of scientists and engineers at LASP maximizes scientific return by:

- Enabling dynamic, collaborative interaction and the exchange of ideas
- Allowing problems to be addressed quickly
- Ensuring all necessary standards are met and precautions taken throughout the process via LASP's Quality Assurance team



(Courtesy LASP)

The CICERO constellation of satellites will include six operational spacecraft by 2016.



(Courtesy LASP)

LASP engineers will assemble the CICERO spacecraft bus on-site.

- The constellation will be fully operational by 2016.
- The network will be continuously updated and expanded, ultimately totaling 24 satellites.

The GPS-RO sensor technology that will be used by CICERO provides highly accurate, independent measurements of pressure, temperature, and moisture in Earth's atmosphere in near real-time. This technology also provides benefits such as:

- Long-term stability
- Three-dimensional global coverage
- All-weather measurements taken during the day or at night
- Low-power operation, which further decreases cost

LASP Student Involvement

As an institute of the University of Colorado Boulder, LASP regularly weaves education into its professional missions. CICERO will be a student-focused satellite project engineered and operated at LASP:

- CICERO will involve graduate and undergraduate level CU-Boulder students throughout the engineering process.
- It will be led by LASP and CU-Boulder professionals.
- Students will help design and build the system and subsystems, and assist in the test phases of the mission.
- The LASP Mission Operations & Data Systems group will train and certify CU-Boulder students to perform mission operations for CICERO in concert with professional staff.

Private Funding with a Public Purpose

Led by GeoOptics Inc., a private environmental Earth observation company, CICERO will be a commercial mission with both private and governmental partners. The mission will:

- Collaborate with federal agencies such as NASA, NOAA, DoD, USAF, and USN
- Sell commercial data to a range of subscriber nations
- Reduce the cost of CICERO's product for each user

For more information on LASP Engineering, please visit: <http://lasp.colorado.edu/home/engineering>.

For further information on the Mission Operations & Data Systems group at LASP, please visit: <http://lasp.colorado.edu/home/mission-ops-data>.

The Laboratory for Atmospheric and Space Physics (LASP) combines all aspects of space exploration through our expertise in science, engineering, mission operations, and data management. As an institute at the University of Colorado Boulder, LASP includes students throughout our activities. Learn more at <http://lasp.colorado.edu>.