# **Global-scale Observations of the Limb and Disk**

Imaging the Boundary Between Earth and Space



GOLD is a NASA Mission of Opportunity that fills a critical gap in our knowledge of Sun-Earth connections. It is examining the response of the upper atmosphere to forcing from the Sun, the magnetosphere, and the lower atmosphere.

#### **GOLD will:**

- provide *unprecedented imaging* of the Earth's upper atmosphere from geostationary orbit;
- be the first mission to study the *weather of the thermosphere-ionosphere*, rather than its climate;
- make breakthrough measurements of temperature and composition that are important for satellite drag and for ionospheric disruptions of communication and navigation; and,
- fly as a hosted payload on a commercial communications satellite, pioneering NASA's cost-effective access to geostationary orbit.

#### Mission Overview:

- High-resolution, far-ultraviolet imaging spectrograph with two identical channels
- Global-scale imaging of the disk with a 30-minute cadence
- Host spacecraft (SES-14) is a commercial communications satellite
- Launch in early 2018 for a two-year nominal mission at geostationary orbit with an extended mission possible
- State-of-the-art space weather models will be used in data analysis

#### Science Objectives:

- Determine how geomagnetic storms alter the temperature and composition of Earth's thermosphere
- Analyze the global-scale response of the thermosphere to solar extreme ultraviolet variability
- Investigate the significance of atmospheric waves and tides propagating from below on the temperature structure of the thermosphere
- Resolve how the structure of the equatorial ionosphere influences the formation and evolution of equatorial plasma density irregularities



INSTRUMENT RESOURCES	
Mass	37 kg
Power average	72 W
Data rate	6 Mb/sec.

## Mission Reliability:

- Dual-channel imaging spectrograph, with each channel capable of all measurements
- High-reliability commercial communications satellite managed by an industry partner committed to and experienced with hosted payloads
- Heritage from instruments built by LASP for Cassini, AIM, SDO, MAVEN, and other missions



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## The GOLD Team:



**University of Colorado Boulder's Laboratory for Atmospheric and Space Physics (LASP)** – *Principal Investigator Richard Eastes and Deputy Principal Investigator William McClintock* lead the mission, coordinate the science team and science operations, and directed instrument development; *Project Managers at LASP* provided the instrument, as well as ongoing project management, systems engineering, safety and mission assurance, instrument operations, and communications and public outreach.

University of Central Florida (UCF) - operates the science data center.

**National Center for Atmospheric Research (NCAR)**—*Project Scientist Alan Burns* coordinates the science team, algorithm development, and scientific analysis.

SES Government Solutions (SES-GS)—provides host satellite, mission operations, and data downlink. National Oceanic and Atmospheric Administration (NOAA)—supports space weather modeling. NASA Goddard Space Flight Center (GSFC) Explorers Program—provides program management. University of California, Berkeley (UCB)—supplies UV detectors and scientific analysis.

Virginia Polytechnic Institute and State University (VT)—provides scientific analysis and space weather modeling.

Computational Physics, Inc. (CPI) – provides algorithm development and implementation.

## Public Outreach:

• Provide GOLD data and Earth images on website in near-real-time; provide opportunities for interactive exchanges with GOLD science team using social media platforms

## Mission Timeline:

