

GOLD

Global-scale Observations of the Limb and Disk

Imaging
Earth's
Interface
to Space



Global-scale Observations of the Limb and Disk, or GOLD, studies Earth's interface to space: the dynamic region where Earth's upper atmosphere meets the space that surrounds us. This little understood region—historically difficult to observe—responds both to terrestrial weather in the lower atmosphere below and the tumult of space weather from above. GOLD inspects the forces responsible for the day-to-day changes in this critical boundary layer.

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Did You Know?

- GOLD is the first NASA science mission to fly as a hosted payload on an otherwise unrelated commercial satellite.
- GOLD collects observations of the upper atmosphere at a 30-minute cadence, enabling it to track the dramatic, rapid changes there. Previous missions in low-Earth orbit could only provide daily observations.
- GOLD teams up with another mission, NASA's Ionospheric Connection Explorer, to provide the most comprehensive observations of the upper atmosphere ever.

GOLD's Science

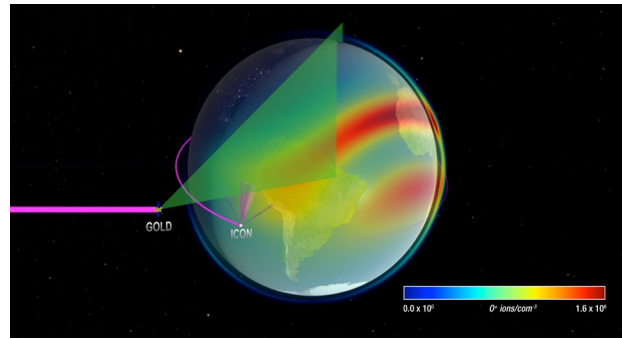
The region GOLD explores is a little like Earth's suburbs: On the outskirts of our home planet, it is both foreign and familiar—and the farther it stretches from the surface, the more it gives way to the wilderness and vastness of space.

Here in the uppermost atmosphere, astronauts and satellites orbit the Earth, and a layer of particles ionized by solar radiation, called the ionosphere, coexists with the neutral atmosphere, called the thermosphere. The two commingle and influence one another constantly. This interplay—and the role terrestrial weather, space weather and Earth's own magnetic field each have in it—is the focus of GOLD's mission.

GOLD creates full-disk ultraviolet images of Earth from its vantage point above the Western Hemisphere. From these, scientists can determine the tempera-

ture and relative amounts of different particles—atomic oxygen and molecular nitrogen—present in the neutral atmosphere, which is useful for determining how these neutral gases shape ionospheric conditions. These data will provide the first maps of the upper atmosphere's changing temperature and composition all over the Americas.

As GOLD enables a deeper understanding of the connection between our atmosphere and near-Earth space, it will help improve models and simulations used to predict the effects of the dynamic changes here, known as space weather. This could lead to



GOLD flies an ultraviolet imaging spectrograph on a geostationary satellite to measure densities and temperatures in Earth's thermosphere and ionosphere. Its overarching view complements the up-close view to be provided by another NASA mission, the Ionospheric Connection Explorer.

ways of improving forecasts and protecting assets in space. With unprecedented detail, GOLD examines the shifts and fluctuations in the ionosphere-thermosphere system that can impact our lives on Earth by disrupting radio, cell phone, or GPS communications used to guide airplanes and ships. Changes in the region can also lead to premature orbital decay of spacecraft and expose astronauts to dangerous bouts of radiation.

GOLD Instrumentation

The GOLD instrument is an imaging spectrograph, an instrument that breaks light down into its component wavelengths,

measuring their intensities. It takes images in far ultraviolet light, which enables scientists to track changes in the upper atmosphere's ever-

changing temperature, density and composition.

GOLD Orbit

GOLD flies in geostationary orbit aboard SES-14, a commercial communications satellite built by Airbus for SES, which owns and operates the satellite. From 22,000 miles above the Western Hemisphere, GOLD has a full-disk view of the upper atmosphere, which it images every 30 minutes. At this cadence, GOLD is the first mission to monitor the day-to-day weather, rather than long-term climate, of this critical region.

GOLD Quick Facts

- Host spacecraft: SES-14
- Launch vehicle: Arianespace's Ariane 5
- Weight: 80 pounds
- Leadership: Led by the University of Central Florida in Orlando. Built by the University of Colorado Laboratory for Atmospheric and Space Physics in Boulder. SES Government Solutions oversaw the integration of the payload. SES GS also procured the launch of the satellite, and facilitates command and control of the payload. NASA's Goddard Space Flight Center oversees the Explorer program, which manages GOLD for NASA HQ.

