The Global-scale Observations of the Limb and Disk (GOLD) instrument is an imaging spectrometer to be launched onboard a commercial communications satellite in 2017. From its vantage point in geosynchronous orbit, GOLD will image the Earth in the far-ultraviolet from 132 to 162 nm. The instrument consists of two independent optical channels, allowing for simultaneous measurements of multiple temperature lines with different temporal sampling and spectral resolution. In addition to continuously scanning the disk of the Earth, GOLD will also perform routine limb scan and stellar occultation measurements. These measurements will be used to retrieve a variety of critical data products characterizing the temperature and composition of the thermosphere-ionosphere, and their response to geophysical storms and solar forcing.

Primary data products include: daytime neutral temperatures near 160 km altitude; daytime O/N ratio column density ratios; nighttime peak electron density; thermospheric O/N density profiles (day and night); daytime exospheric neutral temperature on the limb; atmospheric temperatures from 170 km altitude up to the exobase; thermospheric wind profiles (day and night); daytime exospheric temperature on the limb; infrared neutral temperatures from 100 to 250 km altitude; and a number of additional products for science follow-on missions. These measurements will be used to create a variety of data products that can be used to understand the Earth's upper atmosphere, including: thermospheric winds, exospheric temperatures, and ionospheric temperatures.

The GOLD Science Data Center (SDC) located at the University of Colorado, Boulder, will be the central repository for all GOLD data. The SDC will provide access to data products through a variety of means, including: an online data archive, a data dissemination system, and a data dissemination system on the ground. The SDC will also provide support to researchers who wish to use the GOLD data for their own research.

GOLD ground-based data systems derived from the mission ground station is transmitted through the Science Operations Center (SOC), and summarized levels of data products at the Science Data Center (SDC) for delivery to users.

Table 1: GOLD Science Data Levels. Processing of levels 1A, 1B, and 1C will be performed at the SDC and transmitted to the SDC for high-level data processing.

### User Support
- UCP and CFI will provide full support at the SDC.
- Support to GOLD science users: Online documentation, Email from the science team.

### Data Latency
- Quick-look data products available within 15 minutes.
- Level 3 data products available within 48-72 hours.

### Data Dissemination
- The SDC will make data products available:
  - via science team
  - Scientific community
  - NASA's National Space Science Data Center (NSSDC)

- Goal is easy and reliable access to data products for all users.
- Minimal web servers for increased bandwidth availability.

### Storage & Archiving
- UCP will be responsible for designing, building and maintaining storage and archive facilities and infrastructure for SDC operational activities.
- Measures for flash tolerance:
  - Mirrored archival sites at UCP
  - Institute for Simulation and Training (IST)
- Archival redundancy between SDC and SOC - LASP will archive all Level 3 data.

### Overview
The Global-scale Observations of the Limb and Disk (GOLD) instrument is an imaging spectrometer to be launched onboard a commercial communications satellite in 2017. From its vantage point in geosynchronous orbit, GOLD will image the Earth in the far-ultraviolet from 132 to 162 nm. The instrument consists of two independent optical channels, allowing for simultaneous measurements of multiple temperature lines with different temporal sampling and spectral resolution. In addition to continuously scanning the disk of the Earth, GOLD will also perform routine limb scan and stellar occultation measurements. These measurements will be used to retrieve a variety of critical data products characterizing the temperature and composition of the thermosphere-ionosphere, and their response to geophysical storms and solar forcing.

Primary data products include: daytime neutral temperatures near 160 km altitude; daytime O/N ratio column density ratios; nighttime peak electron density; thermospheric O/N density profiles (day and night); daytime exospheric neutral temperature on the limb; atmospheric temperatures from 170 km altitude up to the exobase; thermospheric wind profiles (day and night); daytime exospheric temperature on the limb; infrared neutral temperatures from 100 to 250 km altitude; and a number of additional products for science follow-on missions. These measurements will be used to create a variety of data products that can be used to understand the Earth's upper atmosphere, including: thermospheric winds, exospheric temperatures, and ionospheric temperatures.

The GOLD Science Data Center (SDC) located at the University of Colorado, Boulder, will be the central repository for all GOLD data. The SDC will provide access to data products through a variety of means, including: an online data archive, a data dissemination system, and a data dissemination system on the ground. The SDC will also provide support to researchers who wish to use the GOLD data for their own research.

GOLD ground-based data systems derived from the mission ground station is transmitted through the Science Operations Center (SOC), and summarized levels of data products at the Science Data Center (SDC) for delivery to users.

Table 1: GOLD Science Data Levels. Processing of levels 1A, 1B, and 1C will be performed at the SDC and transmitted to the SDC for high-level data processing.

### User Support
- UCP and CFI will provide full support at the SDC.
- Support to GOLD science users: Online documentation, Email from the science team.

### Data Latency
- Quick-look data products available within 15 minutes.
- Level 3 data products available within 48-72 hours.

### Data Dissemination
- The SDC will make data products available:
  - via science team
  - Scientific community
  - NASA's National Space Science Data Center (NSSDC)

- Goal is easy and reliable access to data products for all users.
- Minimal web servers for increased bandwidth availability.

### Storage & Archiving
- UCP will be responsible for designing, building and maintaining storage and archive facilities and infrastructure for SDC operational activities.
- Measures for flash tolerance:
  - Mirrored archival sites at UCP
  - Institute for Simulation and Training (IST)
- Archival redundancy between SDC and SOC - LASP will archive all Level 3 data.

### Overview

#### Exospheric Temperature

**Algorithm**

Exospheric temperatures T_e will be derived from the limb data through fitting of the OI LBH radiance profiles. 200 km T_e combined with the FUV T_e to form a radiation temperature for each pixel. This work will be used to compare with the electron density retrieval. The LBH algorithm will be used on the ACE/CRIDW narrowband. This approach has been successful in validating the 200 km T_e.

**References**


#### Peak Electron Density

**Algorithm**

The OI LBH algorithm has been developed for use with GUVI and SUSIM images, and will take advantage of the solar wind effects on the thermosphere as well as the ultraviolet measurements from the LBH. The algorithm has been extensively documented and tested.

**References**


#### Ionospheric Bubbles

**Algorithm**

Ionospheric Bubbles

**References**