P1.27 CALIPSO DATA AND TOOLS AVAILABLE FROM THE NASA LANGLEY ATMOSPHERIC SCIENCE DATA CENTER

Linda A. Hunt
SSAI/NASA Langley Research Center, Hampton, VA

1. INTRODUCTION

The Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) satellite was launched into a sun-synchronous orbit on April 28, 2006, where it joined the A-Train constellation of four other Earth-orbiting satellites: Aqua, Aura, CloudSat and PARASOL. CALIPSO is a joint mission between NASA and CNES, the French space agency.

The primary objective of CALIPSO's three-year mission is to make a global survey of the vertical structure of clouds and aerosols and their physical properties. The NASA Langley Atmospheric Science Data Center (ASDC) is the archive and distribution center for CALIPSO data.

2. CALIPSO INSTRUMENTS

CALIPSO comprises three instruments, the Cloud-Aerosol LIdar with Orthogonal Polarization (CALIOP), the Imaging Infrared Radiometer (IIR), and the Wide Field Camera (WFC).

CALIOP is a two-wavelength, polarization-sensitive lidar that provides information about the composition of clouds, the abundance and sizes of aerosols, and the altitudes of cloud and aerosol layers. In November 2007, the lidar pointing angle was modified from 0.3° to 3.0° forward from nadir in the along-track direction to improve lidar performance when observing high altitude clouds with oriented ice crystals.

The IIR measures outgoing radiation at three wavelengths in the thermal infrared window (8.65 mm, 10.6 mm, and 12.0 mm) to determine cloud emissivity and particle size.

The high resolution, nadir-viewing WFC images the region around the lidar and IIR measurements in a single spectral channel, to provide context for data from the other two instruments. The WFC camera wavelength of 645 nm is matched to Band 1 of the MODIS instrument on the Aqua satellite in the A-Train.

More information about the CALIPSO project is available at http://www-calipso.larc.nasa.gov.

* *Corresponding author address*: User and Data Services, Atmospheric Science Data Center, NASA Langley Research Center, MS 157D, Hampton, VA 23681-2199; e-mail: larc@eos.nasa.gov

3. CALIPSO DATA PRODUCTS

CALIPSO produces Level 1 and Level 2 archived science data products. The Level 1 data include:

- lidar calibrated and geolocated profiles for the day and night portions of the orbit, with associated browse imagery
- IIR geolocated, calibrated radiances registered to a 1 km grid centered on the lidar track
- WFC calibrated, geolocated radiance and bi-directional reflectance at 125 m and 1 km resolution for the daytime portion of each orbit. There are two 1km resolution products that cover the full 61km swath of the instrument, one centered on the lidar ground track and one on the same grid as the IIR data. The 125m resolution product covers the central 5 km portion of the swath.

Level 2 products include:

- a cloud layer product with horizontal resolutions of 1/3 km, 1 km and 5 km which includes cloud height, thickness, backscatter, extinction, ice/water phase, emissivity, and ice particle size
- an aerosol layer product at 5 km resolution which includes height, thickness, optical depth, and integrated attenuated backscatter
- an aerosol profile product with a horizontal resolution of 40 km and vertical resolution of 120 m which includes backscatter, extinction, and depolarization ratio
- a cloud profile product with a horizontal resolution of 5 km, a 60 m vertical resolution, and a vertical extent of 20.2 km with backscatter and extinction profiles and ice water content
- a vertical feature mask with aerosol and cloud layer location (both vertically and horizontally), layer type, and the amount of horizontal averaging required for the layer to be detected
- IIR Level 2 cloud emissivity and particle size in 1 km pixels, with a 70 km swath width co-located to the lidar track (not yet released)

The lidar Level 1 and Level 2 products were recently reprocessed with new algorithms and released as version 2.01.

4. CALIPSO DATA ACCESS

CALIPSO data ordering methods, documentation, software tools for working with the data, and links to related sites are available from the ASDC CALIPSO web page: <http://eosweb.larc.nasa.gov/PRODOCS/calipso/table_calipso.html>
New services and tools will be advertised here as they become available. Users can also sign up for the CALIPSO news list to receive via e-mail information and announcements relating to CALIPSO data.

5. CONCLUSION

CALIPSO data are providing new insights into aerosols, including volcanic emissions, dust storms, and pollution events, and clouds, including thin cirrus and Polar Stratospheric clouds. Below are examples of features observed in CALIPSO lidar browse imagery (images provided by the NASA LaRC CALIPSO team).

The ASDC provides data access, services and tools for over 40 projects in the discipline areas of Earth's radiation budget, clouds, aerosols and tropospheric chemistry. Additional information is available from our web site, http://eosweb.larc.nasa.gov.

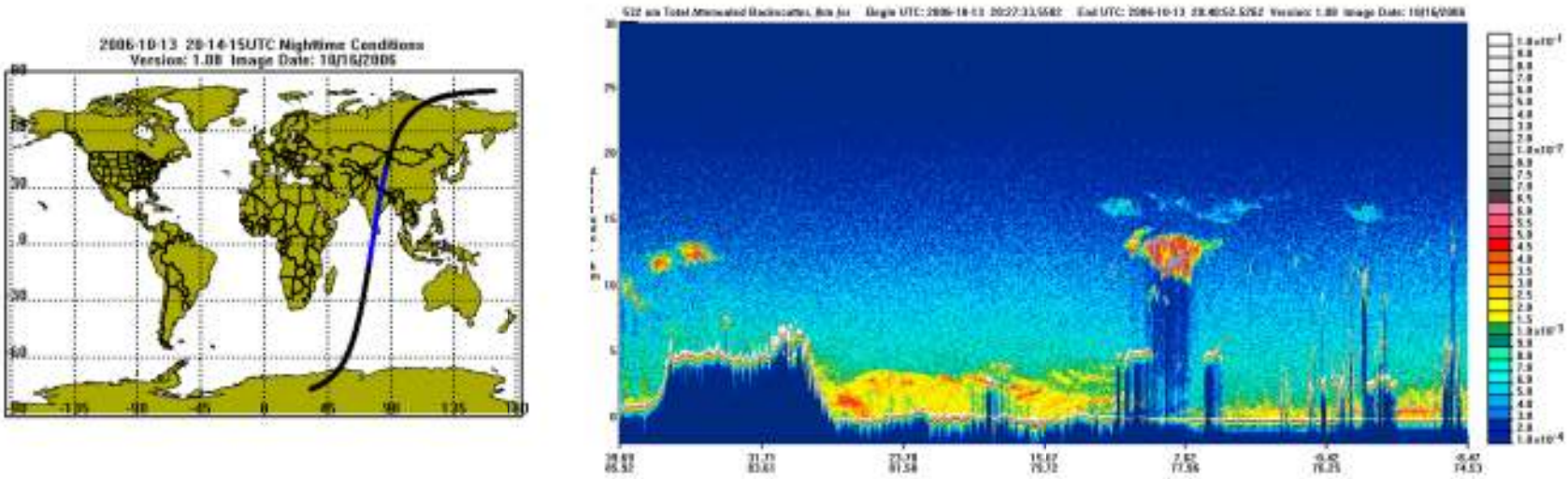

Figure 1. Himalayan Mountains and pollution pool over northern India.

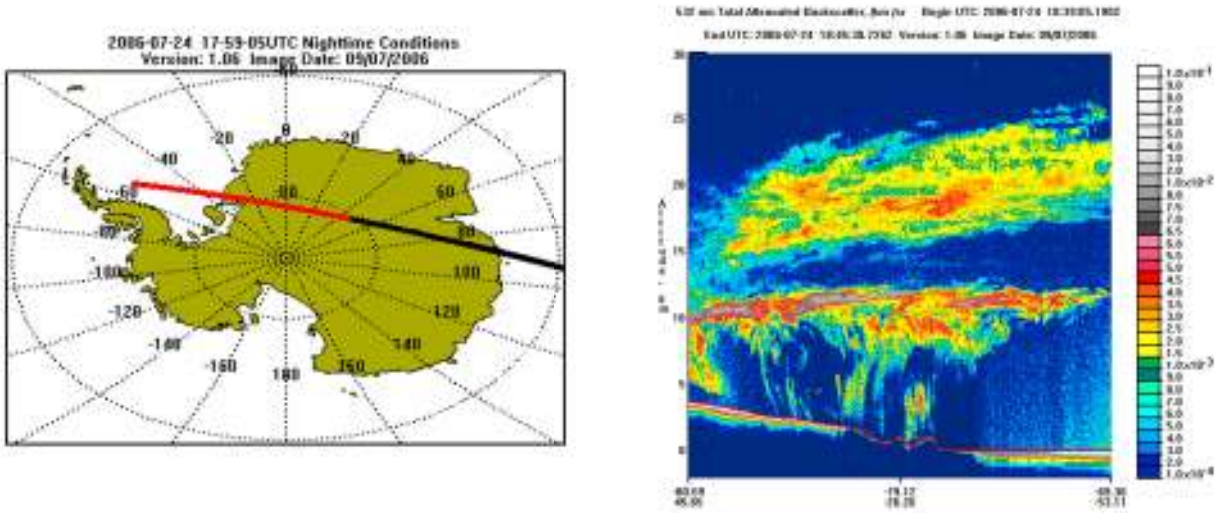

Figure 2. Polar Stratospheric Clouds over Antarctica.