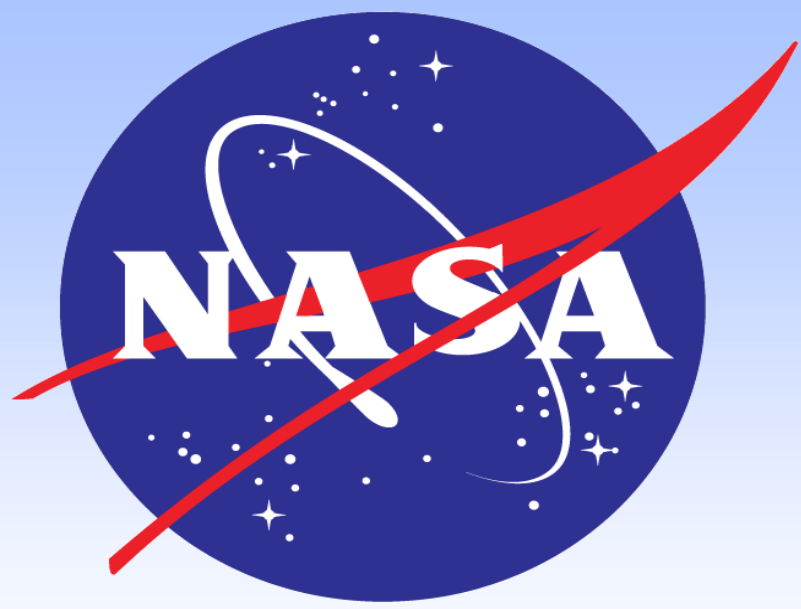




Laser Remote Sensing from ISS: CATS Cloud and Aerosol Data Products

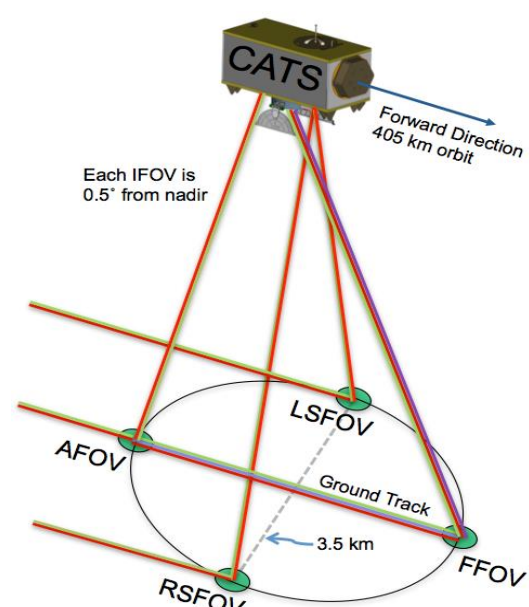
Sharon Rodier⁽¹⁾, Steve Palm⁽²⁾, Mike Jensen⁽¹⁾, John Yorks⁽²⁾, Matt McGill⁽⁴⁾, Mark Vaughan⁽³⁾, Chip Trepte⁽³⁾, Tim Murray⁽¹⁾

⁽¹⁾ Science Systems and Applications Inc., Langley Research Center, Hampton VA, USA

⁽²⁾ Science Systems and Applications Inc., Goddard Space Flight Center, Greenbelt, MD USA

⁽³⁾ NASA, Langley Research Center, Hampton VA, USA

⁽⁴⁾ NASA, Goddard Space Flight Center, Greenbelt, MD USA



Introduction:

The NASA Cloud Aerosol Transport System (CATS) is a dual-beam, multi-wavelength (1064, 532 and 355 nm), polarization sensitive (1064 and 532 nm) lidar developed at NASA's Goddard Space Flight Center (GSFC) for deployment to the International Space Station (ISS) in late 2014. CATS will be mounted on the Japanese Experiment Module's Exposed Facility (JEM_EF) and will provide near-continuous, altitude-resolved measurements of clouds and aerosols in the Earth's atmosphere. The ISS orbit path provides a unique opportunity to capture the full diurnal cycle of cloud and aerosol development and transport, allowing for studies that are not possible with the lidar aboard the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) mission, which flies in the sun-synchronous A-Train orbit.

One of the primary objectives of CATS is to continue the CALIPSO aerosol and cloud profile data record to provide continuity of lidar climate observations during the transition from CALIPSO to EarthCARE. To accomplish this, the CATS project at GSFC and the CALIPSO project at NASA's Langley Research Center (LaRC) are closely collaborating to develop and deliver a full suite of CALIPSO-like level 2 data products that will be produced using the newly acquired CATS level 1B data. The CALIPSO mission is now well into its eighth year of on-orbit operations, and has developed a robust set of mature and well-validated science algorithms to retrieve the spatial and optical properties of clouds and aerosols from multi-wavelength lidar backscatter signal. By leveraging both new and existing NASA technical resources, this joint effort by the CATS and CALIPSO teams will enable rapid delivery of high-quality lidar data sets to the user community at the earliest possible opportunity

We outline the development of the CATS "**Heritage**" level 2 software and data products and describe the modifications made to the input CATS data stream and the CALIPSO Level 2 processing algorithms in order to successfully interface two disparate data processing systems. We use simulated CATS level 1B data to provide an initial assessment of CATS level 2 data quality.

CATS Data/Process Flow:

CALIPSO Monthly Scattering ratios [Molecular Backscatter Coefficient 532nm/ Total Attenuated Backscatter 532nm] are provided to the GSFC CATS team for calibration purposes. Monthly files contain 2degree grids from 51N to 51S at 12 altitude bins [22km – 28km].

To meet the requirements of archival and distribution of the CATS L1B granules and create CATS Heritage Level 2 data products with the CALIPSO algorithms, we have created 4 Product Generation Executable (PGEs)

PGEs

L1B Ingest and Archive:

CATS L1B Operational files are pushed to the LARC DACC, where necessary files are created for ingest and archival.

L1 Pre-Processor:

Converts CATS L1B Files into a CALIPSO-like Level 1B format :
Converts CATS backscatter to CALIPSO-like L1B sample resolution
Converts UTC time and creates TAI time
Interpolates Metrological data & calculates Molecular Density
Adds missing parameters
Retrieves National Snow and Ice (2-day delay)
Writes intermediate file in HDF4
Execution control by the Calipso Automotive Processing System (CAPS)

L2 Analysis:

The same algorithms and retrieval codes (SIBYL) that produce the CALIPSO data products will be used to create CATS Heritage Level 2 Layer, Profile and Vertical Feature Mask products. One instance of SIBYL will execute for each CATS FOV with run time parameters turned for the CATS instrument.

L2 File Merge:

Creates one L2 file for each data product that contains both FOV

