CALIPSO Quality Statements
Lidar Level 1.5 Data Product
Version Release: 3.02

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Introduction

This document provides a high level quality assessment of the CALIPSO lidar level 1.5 expedited data product, derived from CALIPSO lidar level 1B, level 2 aerosol profile, and level 2 vertical feature mask expedited products, as described in section 6.0 of the CALIPSO Data Products Catalog (Version 3.3) (PDF). As such, it represents the minimum information needed by scientists and researchers for appropriate and successful use of these data products. We strongly suggest that all authors, researchers, and reviewers of research papers review this document periodically, and familiarize themselves with the latest status before publishing any scientific papers using these data products.

These data quality summaries are published specifically to inform users of the accuracy of CALIOP data products as determined by the CALIPSO Science Team and Lidar Science Working Group (LSWG). This document is intended to briefly summarize key validation results; provide cautions in those areas where users might easily misinterpret the data; supply links to further information about the data products and the algorithms used to generate them; and offer information about planned algorithm revisions and data improvements.

Additionally, since lidar level 1.5 is a merged data product, this document describes and assesses attributes specific to the level 1.5 product. Users are advised to consult the Data Quality Summaries for the lidar level 1B, lidar level 2 aerosol profile, and lidar level 2 vertical feature mask products for detailed quality information of the inputs for level 1.5.

Data Availability

The CALIPSO lidar level 1.5 expedited data product is currently available by subscription only. Since it is designed for near-real time applications, granules are produced in forward processing **and only the most recent ten days are accessible via ftp**. Please contact the CALIPSO Principal Investigator David Winker and CALIPSO Data Manager Pat Lucker to obtain a subscription to access level 1.5 expedited data.

Data Product Maturity

The initial release of the CALIPSO lidar level 1.5 expedited data product is considered beta, as defined in the table below. Even though level 1.5 is a merged product based on level 1B and level 2 data products which are at higher maturity levels, the algorithms used for cloud-clearing and re-averaging are still considered beta, thus the maturity of all scientific data sets reported by level 1.5 are uniformly classified beta for this release.

Maturity Level Definition

Beta:	Early release products for users to gain familiarity with data formats and parameters. **Users are strongly cautioned against the use of these data products as the basis for research findings, journal publications, and/or presentations.**

Documentation and References

Algorithm Theoretical Basis Documents (ATBDs)

- PC-SCI-202.01 - Mission, Instrument, and Algorithms Overview (PDF)
- PC-SCI-202.02 - Feature Detection and Layer Properties Algorithms (PDF)
- PC-SCI-202.03 - Scene Classification Algorithms (PDF)
- PC-SCI-202.04 - Extinction Retrieval Algorithms (PDF)

General References

- PC-SCI-503 : CALIPSO Data Products Catalog (Version 3.3) (PDF)
- Data analysis overview: Fully automated analysis of space-based lidar data: an overview of the CALIPSO retrieval algorithms and data products (PDF)

- CALIPSO algorithm papers published in a special issue of the Journal of Atmospheric and Oceanic Technology
- Peer-reviewed CALIPSO validation papers
- Additional peer-reviewed publications discussing scientific applications and studies using CALIPSO data
- Recent conference proceedings covering a broad range of CALIPSO-related science and data analysis topics
- CALIPSO Data Read Software

Papers

- Vaughan, M., C. Trepte, D. Winker, M. Avery, J. Campbell, R. Hoff, S. Young, B. Getzewich, J. Tackett, and J. Kar, 2011: "Adapting CALIPSO Climate Measurements for Near Real Time Analyses and Forecasting", Proceedings of the 34th International Symposium on Remote Sensing of Environment, [Available at Vaughan, et al (PDF)].

CALIPSO Lidar Level 1.5 Expedited Data Product

Overview

NOTICE
The CALIPSO lidar level 1.5 expedited data product is an unvalidated, beta-quality product. Though it is a merger of existing CALIPSO data products at higher maturity levels, the algorithms used to cloud-clear and re-average these products in order to produce level 1.5 data are considered beta. As such, level 1.5 data may contain any number of errors and/or inconsistencies. Users are cautioned against the indiscriminate use of these data products; using them as the basis for research findings, journal publications, and/or presentations at scientific conferences is strongly discouraged.

The CALIPSO lidar level 1.5 expedited data product contains continuous, calibrated, and geo-located profiles of attenuated backscatter and aerosol extinction coefficients that have been screened of clouds, overcast, surface, subsurface, totally attenuated, and invalid features before being averaged to 20 km horizontal x 60 m vertical resolution. It is a synthesis of CALIPSO lidar level 1B expedited and lidar level 2 expedited aerosol profile products with the lidar level 2 expedited vertical feature mask which is used for feature identification and subsequent screening. Thus, it is deemed a "level 1.5" expedited product and it is currently available by subscription only.

Quality statement for expedited data used as input for level 1.5 data product

Input granules for the beta release of lidar level 1.5 expedited data product are CALIOP lidar level 1B, level 2 aerosol profile, and level 2 vertical feature mask expedited products, version 3.02. Expedited CALIPSO data products are designed to be generated faster than standard CALIPSO data products for near-real time forecasting purposes. Two issues impact the quality of expedited level 1B processing versus standard processing: calibration and geolocation. As discussed in Vaughan et al. (2011), mean differences between version 3.01 expedited and standard calibrations are less that 1% for 532 nm (though extreme differences are in excess of 10%). Altitude registration differences are no greater than 60 m and are less than 30 meters 97% of the time.

Differences in calibration, Global Modeling and Assimilation Office (GMAO) molecular model used, and geolocation in expedited processing versus standard processing also affects level 2 expedited data products. In particular, differences in the GMAO molecular model used in the calibration region impacts the ability to detect faint layers in expedited processing, but has little effect on more robust layers. Cloud-aerosol discrimination can also be influenced due to all three of these issues. In comparing level 2 vertical features masks from expedited versus nominal processing, differences in layer detection occurred for ~3% of all range bins - with slightly higher differences at nighttime. Changes in layer classification occurred for ~1% of samples detected at night and ~6% of samples detected during the day.

Impact of using expedited data as input for level 1.5 data

The consequence of using expedited data products instead of standard data products as inputs for level 1.5 expedited processing manifests itself in the magnitude of attenuated backscatter and aerosol extinction coefficients via the expedited calibration coefficients. As described above, level 1.5 expedited attenuated backscatter coefficients should be comparable to their standard processing counterparts to within 1-2%. However, the aerosol extinction coefficients are derived from the solution of a highly non-linear equation whose outputs are very sensitive to changes in its inputs. Thus, large discrepancies can exist between aerosol extinction coefficients in expedited versus standard processing.

Cloud-clearing with the expedited vertical feature mask should be robust compared to the standard vertical feature mask since discrepancies in layer detection occurs for mostly for faint layers (optically thin aerosol layers and sub-visible cirrus); i.e., optically thick cloud layers are detected with nearly equal regularity in the expedited products and are screened out accordingly. The primary objective of level 1.5 processing is to remove clouds and surface features from the attenuated backscatter signal. Since these features are readily detectable with both expedited and standard level 2 processing, cloud and surface clearing are expected to be effective for both processing methods.

Product Descriptions

CALIPSO lidar level 1.5 expedited data products provide profiles of attenuated backscatter and aerosol extinction coefficients that have been screened of clouds, overcast, surface, subsurface, totally attenuated, and invalid features. Data is averaged to a uniform 20 km horizontal x 60 m vertical resolution and is reported from -0.5 km to 20 km in altitude. Feature classification as determined by the CALIPSO scene classifier is reported by the L2 Feature Type array. Descriptions of the individual data fields reported in level 1.5 are provided below and, where appropriate, an assessment of data quality for the current release is given. Data descriptions are grouped into several major

categories, as follows:

Column Time Parameters

Profile Time
Time, expressed in International Atomic Time (TAI) at the temporal midpoint of each 20 km horizontal resolution profile (average time of the 30th and 31st consecutive laser shots). Units are in seconds, starting from January 1, 1993.

Profile UTC Time
Similar to the Profile Time, but for time expressed in Coordinated Universal Time (UTC), and formatted as "yymmdd.ffffffff", where "yy" represents the last two digits of the year, "mm" and "dd" represent the month and day, respectively, and "ffffffff" is the fractional part of the day.

Day Night Flag
Indicates the lighting conditions at an altitude of ~24 km above mean sea level; 0 = day and 1 = night. In lidar level 1.5 expedited profiles where the day/night terminator is crossed within the 20 km horizontal averaging interval, Day Night Flag is assigned a value of 2 for "day and night". This occurs in the expedited products because expedited granules are 90 minutes in duration and contain data recorded at both day and night.

Geolocation and Altitude Registration

Latitude
Geodetic latitude, in degrees, at the temporal midpoint of each 20 km horizontal resolution profile (average of laser footprint latitudes at the 30^{th} and 31^{st} consecutive laser shots).

Longitude
Longitude, in degrees, at the temporal midpoint of each 20 km horizontal resolution profile (average of laser footprint longitudes at the 30^{th} and 31^{st} consecutive laser shots).

Lidar Data Altitude
This HDF metadata field defines the altitudes of the 345 range bins to which the lidar level 1.5 profile products are registered. Altitudes extend from approximately -0.5 km to 20.2 km with a vertical resolution of 60 meters.

Profile Identification

Profile ID
This is a 32-bit integer generated sequentially for each single-shot profile record in the level 1B products. Each profile ID is unique within each granule. For level 1.5 data products, only the first and last profile ID for each 20 km resolution profile are reported (corresponding to the 1^{st} and 60^{th} laser shots).

Profile Meteorological Data

Molecular Number Density (external)
Mean molecular number density, in molecules per cubic meter, reported for the temporal midpoint of each range bin in each 20 km horizontal resolution profile (i.e., the average of the molecular number densities reported at the 30^{th} and 31^{st} consecutive single shot profiles for each range bin). Derived from the GEOS-5 data product provided to the CALIPSO project by the GMAO Data Assimilation System and logarithmically interpolated from the 33 standard altitudes levels reported in the lidar level 1B products (Met Data Altitudes) to the 345 standard altitude levels reported in the lidar level 1.5 product (Lidar Data Altitudes) prior to computing the temporal midpoint average.

Ozone Number Density (external)

Mean ozone number density, in molecules per cubic meter, reported for the temporal midpoint of each range bin in each 20 km horizontal resolution profile (i.e., the average of the ozone number densities reported at the 30th and 31st consecutive single shot profiles for each range bin). Derived from the GEOS-5 data product provided to the CALIPSO project by the GMAO Data Assimilation System and logarithmically interpolated from the 33 standard altitudes levels reported in the lidar level 1B products (Met Data Altitudes) to the 345 standard altitude levels reported in the lidar level 1.5 product (Lidar Data Altitudes) prior to computing the temporal midpoint average.

Pressure (external)

Mean pressure, in millibars, reported for the temporal midpoint of each range bin in the 20 km horizontal resolution profile (i.e., the average of the pressure reported at the 30th and 31st consecutive single shot profiles for each range bin). Derived from the GEOS-5 data product provided to the CALIPSO project by the GMAO Data Assimilation System and logarithmically interpolated from the 33 standard altitudes levels reported in the lidar level 1B products (Met Data Altitudes) to the 345 standard altitude levels reported in the lidar level 1.5 product (Lidar Data Altitudes) prior to computing the temporal midpoint average.

Temperature (external)

Mean temperature, in degrees C, reported for the temporal midpoint of each range bin in the 20 km horizontal resolution profile (i.e., the average of the temperature reported at the 30th and 31st consecutive single shot profiles for each range bin). Derived from the GEOS-5 data product provided to the CALIPSO project by the GMAO Data Assimilation System and linearly interpolated from the 33 standard altitudes levels reported in the lidar level 1B products (Met Data Altitudes) to the 345 standard altitude levels reported in the lidar level 1.5 product (Lidar Data Altitudes) prior to computing the temporal midpoint average.

Surface Elevation Statistics

Surface Elevation Mean

Average of the surface elevation of all laser footprints within each 20 km horizontal resolution profile, in kilometers above local mean sea level, obtained from the GTOPO30 digital elevation map (DEM).

Surface Elevation stDev

Standard deviation of the surface elevation of all laser footprints within each 20 km horizontal resolution profile, in kilometers above local mean sea level, obtained from the GTOPO30 digital elevation map (DEM).

Feature Spatial Information Within Column

Samples Averaged

Number of full resolution samples averaged within each profile range bin after screening clouds, overcast, surface, subsurface, totally attenuated, and invalid features. Here, "full resolution" is taken to mean single shot (~1/3 km) horizontally and 30 meters vertically. Since level 1.5 profile range bins are averaged to 20 km horizontal x 60 meters vertical, there are at most 120 full resolution samples averaged per lidar level 1.5 range bin.

L2 Feature Type

Reports the results of the CALIPSO level 2 layer detection and scene classification algorithms for tropospheric features within each lidar level 1.5 profile range bin. For each 20 km horizontal x 60 m vertical lidar level 1.5 profile range bin, the L2_Feature_Type reports a 4-element array of 8-bit unsigned integers. Each of these four array elements corresponds to a 5 km horizontal x 60 m vertical segment of data that was considered for averaging. Values for L2_Feature Type are as follows:

Value	L2 Feature Type	Value	L2 Feature Type
0	invalid (bad or missing data)	11	mixed aerosol
1	totally attenuated	12	cloud-cleared mixed aerosol
2	surface	13	cloud-cleared clean marine
3	subsurface	14	cloud-cleared dust
4	cloud	15	cloud-cleared polluted continental
5	clean marine	16	cloud-cleared clean continental
6	dust	17	cloud-cleared polluted dust
7	polluted continental	18	cloud-cleared smoke/biomass burning
8	clean continental	19	"clear air"
9	polluted dust	20	cloud-cleared "clear air"
10	smoke/biomass burning	21	overcast

Overcast is defined as all range bins beneath the highest cloud in a profile. The convention for defining clouds and overcast features with L2_Feature_Type is to classify the entire continuous vertical extent of the highest cloud in a profile as cloud (4) and then classify

all range bins beneath that cloud as overcast (21) until the first totally attenuated, surface, or subsurface range bin.

Cloud-cleared aerosols refer to aerosols that have been detected after 1/3 km and/or 1 km horizontal resolution clouds have been cleared by the level 2 scene classification algorithms. Similarly, cloud-cleared "clear air" refers to segments of "clear air" where 1/3 km and/or 1 km resolution clouds have been cleared.

Mixed aerosols identify 20 km x 60 m resolution elements containing more than one aerosol type. Cloud-cleared mixed aerosols identify 20 km x 60 m resolution elements containing more than one aerosol subtype where at least one is cloud-cleared as defined above.

Note that stratospheric features are not reported in the level 1.5 products. The convention for handling stratospheric features is as follows. Between 60° N and 60° S, medium and high confidence stratospheric features are reported as "clear air"; all other stratospheric features are assumed to be clouds. Poleward of 60°, all stratospheric features are assumed to be clouds (e.g., PSCs).

IMPORTANT: regions of data in the lidar level 1B and lidar level 2 aerosol profile products having L2_Feature_Type values of 0 through 4 and 21 are NOT INCLUDED when computing the cloud-cleared averaged data that is recorded in the attenuated backscatter and aerosol extinction coefficient profiles.

Profile QA Information

Extinction QC Flag 532 Maximum

Extinction QC flags are bit-mapped 16-bit integers reported for each profile range bin where an extinction solution was attempted. It summarizes the final state of the extinction attempt. For the level 1.5 products, the maximum value of all screened extinction QC flags (taken from the lidar level 2 aerosol profile product) within each 20 km x 60 m resolution profile range bin is reported. Complete information about extinction QC flags and their bit assignments can be found in the CALIPSO Extinction Retrieval ATBD (PDF).

Profile Attenuated Backscatter and Extinction Coefficients

Total Attenuated Backscatter 532 Mean
Perpendicular Attenuated Backscatter 532 Mean

For each variety of lidar level 1B expedited attenuated backscatter coefficients listed above, this is the mean of those attenuated backscatter coefficients within each 20 km horizontal x 60 meter resolution level 1.5 profile range bin after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out, in units of $km^{-1}sr^{-1}$.

Total Attenuated Backscatter 532 Median
Total Attenuated Backscatter 532 stDev
Perpendicular Attenuated Backscatter 532 Median
Perpendicular Attenuated Backscatter 532 stDev

For each variety of lidar level 1B expedited attenuated backscatter coefficients listed above, this is the median and standard deviation of those screened attenuated backscatter coefficients within each 20 km horizontal x 60 meter resolution level 1.5 profile range bin after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out, in units of $km^{-1}sr^{-1}$. Since the lower troposphere (-0.5 km to 8.2 km) and upper troposphere (8.2 km to 20.2 km) are averaged to different resolutions in lidar level 1B products, the lower troposphere data are first averaged to upper tropospheric resolution prior to computing the median and standard deviation. Thus, these statistics should be regarded as the median and standard deviation of those screened 1 km x 60 m resolution attenuated backscatter coefficients within each 20 km x 60 m lidar level 1.5 profile range bin.

Total Attenuated Backscatter 532 Uncertainty
Perpendicular Attenuated Backscatter 532 Uncertainty

For each variety of lidar level 1B expedited attenuated backscatter coefficients listed above, this is the uncertainty on the mean of those screened attenuated backscatter coefficients within each 20 km horizontal x 60 meter resolution level 1.5 profile range bin after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out, in units of $km^{-1}sr^{-1}$.

Attenuated backscatter uncertainty is an estimate of random error based on level 1B noise scale factors (Liu et al., 2006 (PDF)). It is first calculated at nominal level 1B range resolution using procedures outlined in Uncertainties for Attenuated Backscatter (PDF) before the uncertainty on the mean σ_μ is calculated for each 20 km x 60 meter profile range bin using (Bevington & Robinson, 1992),

$$\sigma_\mu = \frac{1}{N}\sqrt{\sum_{i=1}^{N}\sigma_i^2}$$

Here, σ_i is the attenuated backscatter uncertainty at a level 1B profile range bin i, and N is the number of level 1B profile range bins within the 20 km x 60 m interval remaining after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out.

Extinction Coefficient 532 Mean
Extinction Coefficient 532 Median
Extinction Coefficient 532 stDev

Mean, median, and standard deviation of all lidar level 2 expedited aerosol profile product extinction coefficients at 532 nm within each 20 km horizontal x 60 meter resolution level 1.5 profile range bin after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out, in units of km^{-1}. Since lidar level 2 aerosol profile products are reported uniformly at 5 km horizontal x 60 m vertical resolution, these statistics should be regarded as the mean, median, and standard deviation of those screened 5 km x 60 m aerosol extinction coefficients within each 20 km x 60 m level 1.5 profile range bin.

Extinction Coefficient 532 Uncertainty

Uncertainty on the mean of all lidar level 2 expedited aerosol profile product extinction coefficients within each 20 km horizontal x 60 meter resolution level 1.5 profile range bin after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out, in units of $km^{-1}sr^{-1}$.

Computed similar to attenuated backscatter uncertainties, except in this case the extinction coefficient uncertainty σ_i is reported by the level 2 aerosol profile products for each 5 km x 60 m profile range bin *i*. Thus, the uncertainty on the mean σ_μ is given by (Bevington & Robinson, 1992),

$$\sigma_\mu = \frac{1}{N}\sqrt{\sum_{i=1}^{N}\sigma_i^2}$$

Here, *N* is the number of lidar level 2 aerosol profile range bins within the 20 km x 60 m interval remaining after clouds, overcast, surface, subsurface, totally attenuated, and invalid features have been screened out.

Calibration Coefficients and Uncertainties

Calibration Constant Parallel 532

Mean of the expedited lidar parallel calibration constants at 532 nm, as defined in Section 3.1.2 of the Lidar Level I ATBD (PDF) within each 20 km horizontal resolution profile. Expedited calibration procedures are described in Vaughan et al. (2011). Units are $km^3 \cdot sr \cdot count$.

Calibration Constant Parallel Uncertainty 532

Mean of the uncertainties due to random noise for expedited 532 nm parallel calibration constants within each 20 km horizontal resolution profile. Computed based on the 532 nm noise scale factors using equation 4.24 in Section 4.3.2 of the CALIPSO Lidar Level I ATBD (PDF). Units are $km^3 \cdot sr \cdot count$.

Calibration Constant Perpendicular 532

Mean of the expedited lidar perpendicular calibration constants at 532 nm within each 20 km horizontal resolution profile. Computed using equation 5.6 in Section 5.1.2 of the Lidar Level I ATBD (PDF). Expedited calibration procedures are described in Vaughan et al. (2011). Units are $km^3 \cdot sr \cdot count$.

Calibration Constant Perpendicular Uncertainty 532

Mean of the uncertainties due to random noise for expedited 532 nm calibration constant within each 20 km resolution profile. Computed based on the 532 nm noise scale factors using equation 5.17 in Section 5.2 of the Lidar Level I ATBD (PDF). Units are $km^3 \cdot sr \cdot count$.

Molecular Model Attenuated Backscatter Profiles

Molecular Model Attenuated Backscatter 532

Molecular attenuated backscatter coefficients at 532 nm, in units of $km^{-1}sr^{-1}$, at the temporal midpoint of each 20 km horizontal resolution level 1.5 profile derived from modeled molecular and ozone number densities provided by the GMAO Data Assimilation System.

Specifically, the GMAO molecular and ozone number densities are logarithmically interpolated from the 33 standard altitudes levels reported in the lidar level 1B products (Met Data Altitudes) to the 345 standard altitude levels reported in the lidar level 1.5 product (Lidar Data Altitudes). The number densities at the temporal midpoint of each 20 km horizontal resolution profile are selected (i.e., the average of the number densities reported at the 30^{th} and 31^{st} consecutive single shot profiles for each range bin).

Backscatter at 532 nm is computed by multiplying the modeled molecular number densities by the 532 nm molecular backscatter cross section. Two-way transmittance due to molecules and ozone is obtained by first calculating extinction coefficients using the 532 nm molecular extinction cross section and the ozone absorption cross section at 532 nm, converting these extinction coefficients to optical depths using trapezoidal integration, and then calculating two-way transmittance. Molecular model attenuated backscatter is the product of the calculated backscatter and two-way transmittance.

File Metadata Parameters

Product ID
An 80-byte (max) character string specifying the product name. For CALIPSO lidar level 1.5 data products, the value of this string will be "Level1.5_Science".

Date Time at Granule Start
A 27-byte character string that reports the date and time at the start of the file orbit segment (i.e., granule) from the level 1B granule. The format is yyyy-mm-ddThh:mm:ss.ffffffZ.

Date Time at Granule End
A 27-byte character string that reports the date and time at the end of the file orbit segment (i.e., granule) from the level 1B granule. The format is yyyy-mm-ddThh:mm:ss.ffffffZ.

Date Time at Granule Production
A 27-byte character string that defines the date and time of the level 1.5 granule production. The format is yyyy-mm-ddThh:mm:ss.ffffffZ.

Initial Subsatellite Latitude
Reports the first subsatellite latitude of the level 1B granule.

Initial Subsatellite Longitude
Reports the first subsatellite longitude of the level 1B granule.

Final Subsatellite Latitude
Reports the last subsatellite latitude of the level 1B granule.

Final Subsatellite Longitude
Reports the last subsatellite longitude of the level 1B granule.

Orbit Number at Granule Start
Reports the orbit number at the level 1B granule start time.

Orbit Number at Granule End
Reports the orbit number at the level 1B granule stop time.

Orbit Number Change Time
Reports the time at which the orbit number changes in the level 1B granule.

Path Number at Granule Start
Reports the path number at the level 1B granule start time.

Path Number at Granule End
Reports the path number at the level 1B granule stop time.

Path Number Change Time
Reports the time at which the path number changes in the level 1B granule.

GEOS Version
A 64-byte character that reports the version of the GEOS data product provided by the GMAO in the level 1B granule.

Level1_Filename
A 160 byte character string reporting the filename of the lidar level 1B granule used to produce the level 1.5 granule.

Level2_VFM_Filename
A 160 byte character string reporting the filename of the lidar level 2 vertical feature mask granule used to produce the level 1.5 granule.

Level2_APro_Filename
A 160 byte character string reporting the filename of the lidar level 2 aerosol profile granule used to produce the level 1.5 granule.

Lidar Data Altitude

Defines the lidar data altitudes (345 range bins) to which the lidar level 1.5 data products are registered.

Initial Lidar Ratios Aerosols 532
Initial Lidar Ratios Aerosols 1064

Reports the initial lidar ratios at 532 nm and 1064 nm wavelengths used for aerosol extinction retrievals in the lidar level 2 aerosol profile product.

Rayleigh Extinction Cross-section 532
Rayleigh Extinction Cross-section 1064

Reports the Rayleigh extinction cross-sections. The values are 5.167e-31 m^2 and 3.127e-32 m^2 for 532 nm and 1064 nm, respectively.

Rayleigh Backscatter Cross-section 532
Rayleigh Backscatter Cross-section 1064

Reports the Rayleigh backscatter cross-sections. The values are 5.930e-32 m^2sr^{-1} and 3.592e-33 m^2sr^{-1} for 532 nm and 1064 nm, respectively.

Ozone Absorption Cross-section 532
Ozone Absorption Cross-section 1064

Reports the Ozone absorption cross-section at 532 nm and 1064 nm. The value is 2.728461e-25 m^2 for 532 nm and 0.0 for 1064 nm.

Data Release Versions

Lidar Level 1.5 Expedited ***90 minute cloud-cleared and re-averaged level 1B and level 2 aerosol extinction data***			
Release Date	**Version**	**Data Date Range**	**Maturity Level**
May 2011	3.02	May 3, 2011 to present	Beta

Data Quality Statement for the release of the CALIPSO Lidar Level 1.5 Expedited Product Version 3.02, May 2011

This is the beta release of the lidar level 1.5 expedited data products. It is a synthesis of three CALIPSO lidar expedited data products: level 1B, level 2 aerosol profile, and level 2 vertical feature mask. As such, the quality of feature screening (cloud, surface, etc) and magnitude of reported attenuated backscatter and aerosol extinction coefficients are heavily dependent on the quality of these input data products - specifically the accuracy of level 1B calibration and the strength of level 2 feature classification. Users are advised to read the data quality summaries of these CALIPSO data products. For this beta release, input granules used to generate the level 1.5 expedited data product are expedited version 3.02 lidar level 1B, lidar level 2 aerosol profile, and lidar level 2 vertical feature mask.