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<http://www-calipso.larc.nasa.gov/>

## Level 3 Aerosol Product Specifications

**Frequency:** Monthly averages  
**Temporal coverage:** Daytime, nighttime, both  
**Spatial coverage:** 360° longitude  
 170° latitude (85°N to 85° S)  
**Spatial resolution:** 5° latitude x 5° longitude  
 60 m vertical resolution

## Aerosol Optical Properties Reported

A full suite of statistics including uncertainties are reported for:

### Vertical profiles

532 nm extinction coefficient  
 532 nm depolarization ratio

### Column integrals

532 nm AOD "cloud-free columns"  
 532 nm AOD "above clouds"  
 532 nm AOD "above clouds and cloud-free columns"

## CALIPSO Level 3 Cloud Product Preview

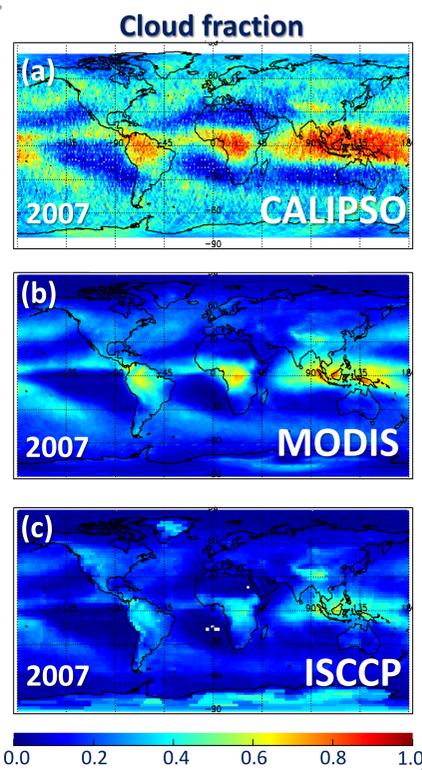
Cloud product specification is underway. Scheduled for release after the level 3 aerosol products.

The corresponding figures show CALIPSO detects high altitude clouds more frequently than MODIS or ISCCP due to its ability to detect optically thin clouds.

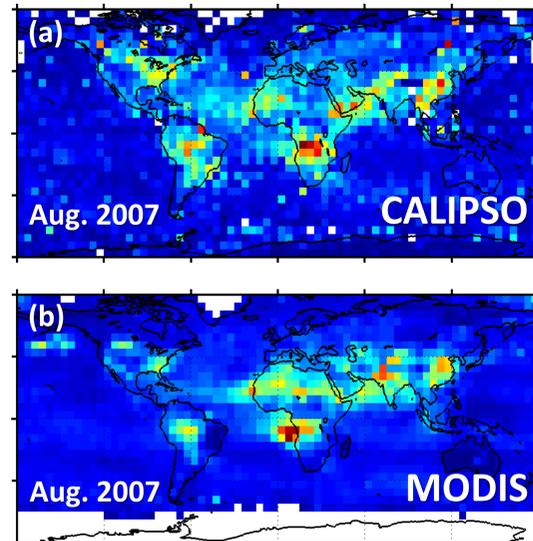
The new product will take advantage of CALIPSO's ability to better vertically resolve cloud structures than with passive satellite instruments.

**Figure 5.** High clouds above 440 hPa during 2007 for (a) CALIPSO, (b) MODIS, and (c) ISCCP.

All data in Fig. 5 downloaded from GEWEX cloud assessment data archive.



## Global Aerosol Optical Depth



MODIS data produced by Giovanni online data system developed and maintained by NASA GES DISC.

Column AOD is reported via vertical integration of the mean or median extinction coefficients.

Here, CALIPSO cloud-free median AOD is compared to MODIS mean AOD for August 2007.

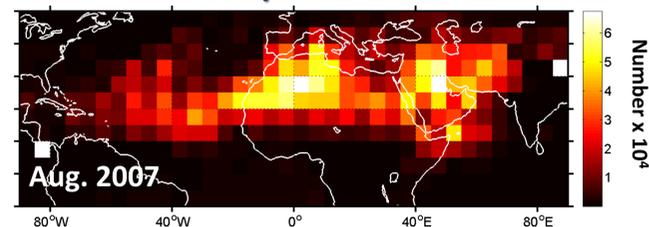
**Figure 1.** (a) CALIPSO median AOD at 532 nm for cloudless columns, day & night, all aerosol species, and (b) MODIS mean AOD 550 nm daytime only, both August 2007.

## Aerosol Typing

CALIPSO can distinguish dust from other aerosol species. Level 3 aerosol optical properties are reported separately by:

- (1) All aerosol species
- (2) Dust only

## Number of dust layers detected



**Figure 2.** Number of dust extinction samples for August 2007, day & night.

## Filters prior to averaging

- No clouds overhead
- No adjacent ice clouds

## Thresholds applied:

- Overlying integrated attenuated backscatter
- Integrated attenuated backscatter
- Extinction uncertainty
- Extinction QC flag
- Cloud-Aerosol Discrimination (CAD) score

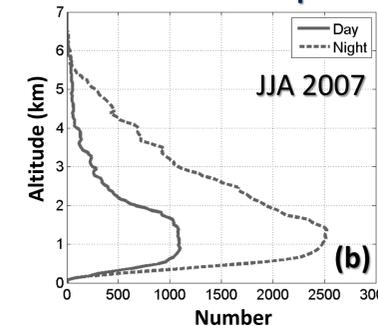
## Summer 2007 Aerosol Extinction Over the Southern Midwest United States

CALIPSO level 3 data can be used to examine diurnal variability of the vertical distribution of aerosol extinction, shown in the June-August 2007 average below (Fig. 4c). Ground-based lidar stations such as the Raman lidar at the ARM Southern Great Plains site can be used for validation efforts and vice-versa.

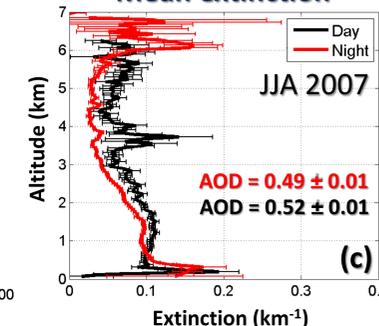
### CALIPSO averaging domain



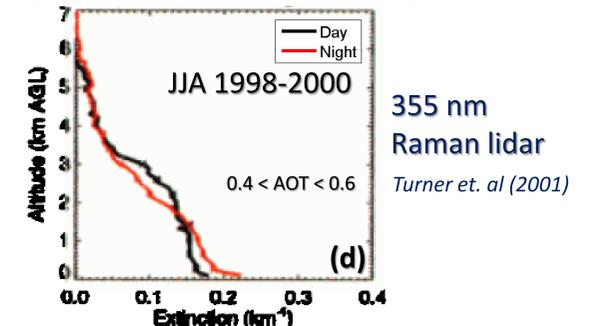
### Number of samples



### Mean extinction



### Ground-based mean extinction



**Figure 4.** (a) CALIPSO averaging domain in white, (b) number of aerosol samples, and (c) mean aerosol extinction for Jun, Jul, Aug 2007 – non-cloudy sky only – compared to (d) 355 nm extinction measured at the ARM Southern Great Plains site during JJA (1998-2000). Figure adapted from Turner et al. (2001).

Turner, D. D., R. A. Ferrare, and L. A. Brasseur (2001), "Average aerosol extinction and water vapor profiles over the Southern Great Plains", *Geophys. Res. Lett.*, 28(23), 4441-4444. CALIPSO data provided by NASA Langley Research Center ASDC.