CALIOP/CALIPSO: Improvement in the aerosol retrieval algorithm and applications


1 ORAU / NASA Ames Research Center, Moffett Field, CA, USA; 2 NASA Langley Research Center, Hampton, VA, USA; 3 Raytheon Environmental Research Institute, Sonoma, CA, USA; 4 Joint Center for Earth Systems Technology (J CET) / Goddard Earth Science and Technology Center (GEST), University of Baltimore County, MA, USA; 5 NASA Ames Research Center, Moffett Field, CA, USA; 6 NASA Goddard Space Flight Center, Greenbelt, MD, USA; contact: kacenelenbogen@nasa.gov

GOAL
Help identify potential shortcomings in the Version 2 Level 2 aerosol extinction product
Illustrate motivation for changes introduced in next version of CALIOP data (Version 3, released in May 2010)
Will help understand and interpret results obtained in previous studies

MODIS versus CALIOP AOD
Fairly good agreement, except for strong peak around 2.2 km (cloud contamination)
Lack of CALIOP values below ~1.4 km and above ~3.2 km and

Issue #1: CALIOP’s failed detection of tenuous aerosol layer and its signal not reaching down to the ground
An alternative CALIOP extinction profile was computed by applying a newly devised extinction retrieval to all previously cloud-screened CALIOP attenuated backscatter profiles in the 40 km region of interest using the HSRL

CALIOP application - Air quality
Good agreement PARASOL – AERONET AOD
AOD MODIS (total) > AOD PARASOL (fine)
Lower PARASOL AOD in Winter case for same PM
Smaller particles in Summer but = same optical properties
Anticyclonic conditions (±1013 hPa, good mixing in BL)
Lower BL in Winter case

CALIOP application - Aerosol Over Cloud (AOC)
Main project: Combined use of CALIOP, MODIS and AHI level 2 aerosol products for calculating direct aerosol radiative effects
During 4-5 Jun 2009 (pass ~1000 km north of St. Petersburg, Russia, in Press)

AOC: Where and When?
Over cloud? Biomass burning aerosols usually strongly absorbing, may cause local positive radiative forcing when over clouds
Preliminary results using CALIOP Skin layer…

References
7. Powell et al., 6th International Laser Radar Conference (ILRC’08)
8. Vaughan et al., 3rd International Laser Radar Conference (ILRC’07)

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