

## **Comparison of aerosol optical depth measured with AERONET sun photometer and spaceborne CALIPSO lidar**

Aerosol optical depth (AOD) describes the total extinction by aerosols in the atmospheric column. It is commonly used for the assessment of the atmospheric aerosol burden from passive remote sensing measurements and to characterize aerosols in chemical transport models. AOD can be measured with high precision by sun photometers. The Aerosol Robotic Network (AERONET) is a global network of sun photometer measurement stations with unified calibration, cloud screening, and data analysis routines. Nowadays, AERONET measurements provide time series on scales from a monthly to a decade. This data can be used for aerosol characterization and validation of spaceborne measurements. The lidar aboard the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) satellite provides a height-resolved view of the global aerosol distribution since the beginning of its mission in June 2006. CALIPSO orbits the Earth in a polar orbit and has a recurring cycle of 16 days.

The aim of this project is to compare AOD from AERONET measurements to findings of the CALIPSO lidar for selected stations with a high coverage of overpasses in close vicinity and to validate the general quality of the CALIPSO AOD product, which is currently labeled as “not to be used for scientific studies”. Special emphasis should be drawn to the height-resolved information provided by the lidar measurements. Based on sites dominated by different aerosol types (e.g., marine aerosol, dust, biomass-burning smoke), possible influences of the aerosol type on the findings of the CALIPSO data retrieval should be evaluated. If time permits, further spaceborne sensors can be included in this study.

Candidates should have a background in atmospheric chemistry or physics and be interested in both active and passive remote sensing. In introduction to the sensors applied in this study will be provided. Programming skills are helpful but no basic requirement for this project. Basic analysis software will be provided but the candidate is encouraged to improve upon it as needed.

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### ***Suggested literature:***

- Eck et al., (1999), *Wavelength dependence of the optical depth of biomass burning, urban, and desert dust aerosols*, J. Geophys. Res., 104, 10.1029/1999JD900923.
- Holben et al., (2001), *An emerging ground-based aerosol climatology: Aerosol optical depth from AERONET*, J. Geophys. Res., 106, 10.1029/2001JD900014.
- Winker et al., (2009), *Overview of the CALIPSO mission and CALIOP data processing algorithms*, J. Atmos. Oceanic Technol., 26, 10.1175/2009JTECHA1281.1.
- Young, S. A. and M. A. Vaughan (2009), *The retrieval of profiles of particulate extinction from Cloud-Aerosol Lidar Infrared Pathfinder Satellite Observations (CALIPSO) data: Algorithm description*, J. Atmos. Oceanic Technol., 26, 10.1175/2008JTECHA1221.1.