

# Aerosol Properties

## ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET



**GLOBAL CLIMATE  
OBSERVING SYSTEM**  
KEEPING WATCH OVER OUR CLIMATE



### ECV IN BRIEF

**Domain:** Atmosphere  
**Subdomain:** Atmospheric Composition  
**Scientific Area:** Physical Properties  
**ECV Stewards:** Paolo Laj, Peng Zhang  
**Products:** Aerosol optical depth,  
 Single-scattering albedo,  
 Aerosol-layer height,  
 Aerosol-extinction coeff. profile



### Aerosol Properties

Atmospheric aerosols are minor constituents of the atmosphere by mass, but a critical component in terms of impacts on the climate and especially climate changes. Aerosols influence the global radiation balance by directly scattering solar radiation and indirectly through influencing cloud reflectivity, cloud cover and cloud lifetime.

### ECV Product<sup>1</sup>

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
<b>Aerosol optical depth</b>	The AOD is the spectral dependant aerosol extinction coefficient integrated over the geometrical path length (dimensionless)	4hr	5-10km/NA/	Max(0.03;10%)	0.02/decade	ESA CCI CMUG tables ( <a href="http://www.esa-cmug-cci.org/">http://www.esa-cmug-cci.org/</a> )
<b>Aerosol-layer height</b>	Height of vertically localized aerosol layer in the free troposphere above sea level (km)	4hr	5-10km/NA/	0.03	0.01	
<b>Single-scattering albedo</b>	The spectrally dependent ratio of the aerosol scattering to the aerosol extinction (dimensionless)	4hr	5-10km/NA/	1km	0.5km	

<sup>1</sup> Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements as part of their contribution to the UNFCCC Global Stocktake. More information on: [climatedata.wmo.int](http://climatedata.wmo.int).



<b>Aerosol-extinction coeff. profile</b>	Spectrally dependent scattering and absorption by a population of aerosol particles per unit of geometrical path length (1/m)	weekly	200-500 km/1km	10%	20%	
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## Data Sources<sup>2</sup>

### In Situ Data:

- ▶ Aerosol Robotoc Network (Aeronet)  
<https://aeronet.gsfc.nasa.gov/>
- ▶ NASA Micro-Pulse Lidar Network (MPLNET )  
<https://mplnet.gsfc.nasa.gov/data?v=V3>
- ▶ World Data Centre for Aerosols (WDCA)  
<http://www.gaw-wdca.org/>
- ▶ Integrated Global Radiosonde Archive (IGRA)  
<https://www.ncdc.noaa.gov/data-access/weather-balloon/integrated-global-radiosonde-archive>
- ▶ Network for the Detection of Atmospheric Composition Change (NDACC)  
<http://www.ndaccdemo.org/data>

### Reanalysis:

- ▶ REANALYSES.ORG (Inventory for Reanalysis)  
<http://reanalyses.org>
- ▶ Monitoring Atmospheric Composition & Climate (MACC), European Centre for Medium-Range Weather Forecasts (ECMWF)  
<http://apps.ecmwf.int/datasets/data/macc-ghg-inversions>

### Satellite:

- ▶ Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate)  
<http://climatemonitoring.info/ecvinventory>

<sup>2</sup> This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s) and reflects the status as of 01/2019. The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.

