

Cloud Properties

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET



ECV IN BRIEF

- Domain:** Atmosphere
- Subdomain:** Atmospheric Composition
- Scientific Area:** Hydrosphere
- ECV Stewards:** Rainer Hollmann
- Products:** Cloud Amount,
Cloud Top Pressure,
Cloud Top Temperature,
Cloud Optical Depth,
Cloud Water Path (liquid/ice),
Cloud Effective Particle Radius
(liquid + ice)

Cloud Properties

The variable properties of clouds determines the clouds profound effects on radiation and precipitation. They are influenced by and in turn influence the motion of the atmosphere on many scales. They are affected by the presence of aerosols, and modify atmospheric composition in several ways, including the depletion of ozone when they form in the polar stratosphere.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RES.	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
Cloud Amount	2D field of fraction of sky filled by cloud	3hr	50km/NA	0.01-0.05	0.01/decade	ESA CCI CMUG tables (http://www.esa-cmug-cci.org/)
Cloud Top Pressure	Pressure of the top of the cloud (highest cloud in the case of multi-layer clouds)	3hr	50km/NA	15-50hPa,	3-15hPa	
Cloud Top Temperature	Temperature of the top of the cloud (highest cloud in case of multi-layer clouds) (Km)	3hr	50km/NA	1-5K;	0.25K/decade	

¹ Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.

Cloud Optical Depth	Effective depth of a cloud from the viewpoint of radiation extinction. $OD = \exp(-K \cdot \Delta z)$ where K is the extinction coefficient [km^{-1}] and Δz the vertical path [km] between the base and the top of the cloud and the reference wavelength to be specified in the metadata. (dimensionless)	3hr	50km/NA	10%,	2%
Cloud Water Path(liquid an ice)	2D Field of atmospheric water in the liquid/solid phase, integrated over the total column (g/m^2)	3hr	50km/NA	25%;	5%
C, effective particle radius (liquid + ice)	Ratio of integral of water droplets size distribution in volume divided by integral in area (μm)	3hr	50km/NA	$1\mu\text{m}$;	$1\mu\text{m}/\text{decade}$

Data Sources²

Reanalysis:

- ▶ REANALYSES.ORG (Inventory for Reanalysis)
<http://reanalyses.org>

Satellite:

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

Global Cloud Cover

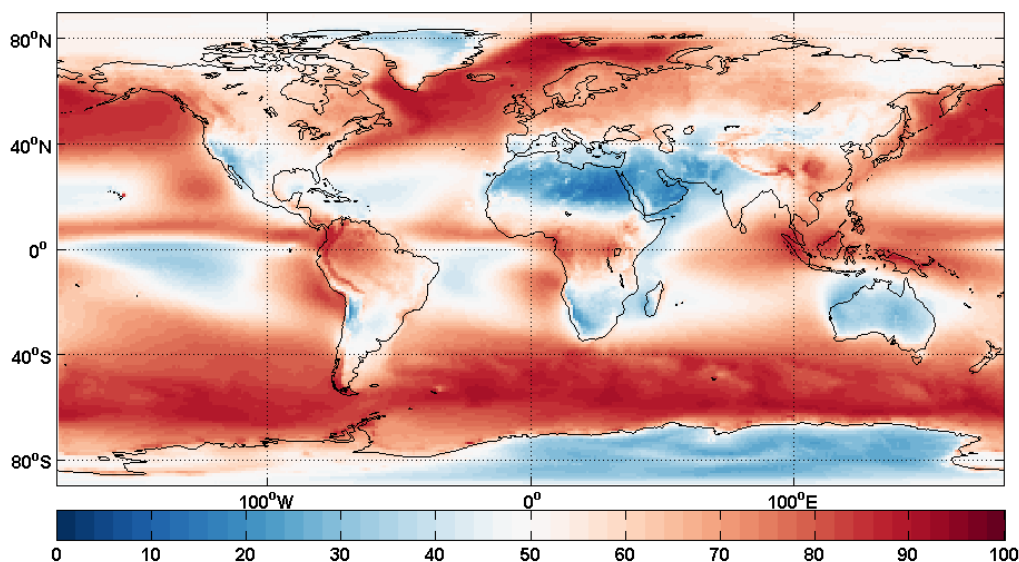


Figure: Climatological mean total cloud fraction averaged over 26-year period (1984–2009) from Climate Monitoring Satellite Application Facility (CM SAF) Cloud, Albedo (CLARA-A2). The CM SAF project is a part of the ground segment of the European organization for the exploitation of meteorological satellites (EUMETSAT).

Source: Karlsson, K.-G.; Devasthale, A. Inter-Comparison and Evaluation of the Four Longest Satellite-Derived Cloud Climate Data Records: CLARA-A2, ESA Cloud CCI V3, ISCCP-HGM, and PATMOS-x. Remote Sens. 2018, 10, 1567.

² 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). 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.



WORLD
METEOROLOGICAL
ORGANIZATION



www.gcos.wmo.int

gcos@wmo.int

[@gcos_un](https://twitter.com/gcos_un)