

Precursors (supporting the Aerosol and Ozone ECVs)

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET



ECV IN BRIEF

- Domain:** Atmosphere
- Subdomain:** Atmospheric Composition
- Scientific Area:** Carbon Cycle and other GHGs
- ECV Stewards:** Dale Hurst, Paolo Laj
- Products:** NO₂ tropospheric column
SO₂,
HCHO tropospheric columns,
CO tropospheric column,
CO tropospheric profile

Precursors (supporting the Aerosol and Ozone ECVs)

Precursor species lead to the production of aerosols and ozone. Precursors include nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and formaldehyde (HCHO). Aerosols and ozone in the near-surface atmosphere can directly harm human health and produce detrimental environmental impacts (e.g., crop damage, acid rain). Reductions in near-surface aerosols and ozone have been observed in specific regions where the emissions of some precursors are regulated.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RES.	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
NO₂ tropospheric column	Molecules of NO ₂ in the atmosphere from surface to tropopause (Molecules/cm ²)	4hr	5-10km/NA	Max(20%,0.03DU)	2%	
SO₂,HCHO tropospheric columns	Total molecules of SO ₂ ,HCHO in the atmosphere from surface to tropopause (Molecules/cm ²)	4hr	5-10km/NA	Max(30%,0.04DU)	5%	
CO tropospheric column	Total molecules of CO in the atmosphere from surface to tropopause (Molecules/cm ²)	4hr	5-10km/NA	Max(20%,20DU);	2%	
CO tropospheric profile	Dry air mole fraction of CO (Mol/mol)	4hr	10km/5km	20%;	2%	

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.

In Situ and Ground-Based Remote Sensing Data:

- ▶ Earth System Research Laboratory Global Monitoring Division CO data
<https://www.esrl.noaa.gov/gmd/dv/iadv/>
- ▶ Network for the Detection of Atmospheric Composition Change (NDACC)
<http://www.ndsc.ncep.noaa.gov/>
- ▶ World Data Centre for Reactive Gases (WDCRG)
<http://www.gaw-wdcr.org/>
- ▶ National Aeronautics and Space Administration (NASA)
<https://gmao.gsfc.nasa.gov/reanalysis/>

Reanalysis:

- ▶ REANALYSES.ORG (Inventory for Reanalysis)
<http://reanalyses.org>
- ▶ Copernicus Atmospheric Monitoring Service (CAMS), MACC Reanalysis of global atmospheric composition, (ECMWF), European Centre for Medium-Range Weather Forecasts (ECMWF)
<http://apps.ecmwf.int/datasets/data/cams-ghg-inversions/>
- ▶ 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>
- ▶ NASA Measurements Of Pollution In The Troposphere (MOPITT)
https://eosweb.larc.nasa.gov/project/mopitt/mopitt_table

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.

