



ECV IN BRIEF

Domain: Atmosphere
Subdomain: Upper Atmosphere
Scientific Area: Energy and Temperature
ECV Stewards: Peng Zhang
Products: Top-of-atmosphere ERB longwave,
 Top-of-atmosphere ERB shortwave (reflected),
 Total solar irradiance,
 Solar Spectral Irradiance



Earth Radiation Budget

The Earth Radiation Budget (at the top of the atmosphere) describes the overall balance between the incoming energy from the sun and the outgoing thermal (longwave) and reflected (shortwave) energy from the earth. It can only be measured from space. The radiation balance at the top of the atmosphere is the basic radiative forcing of the climate system. Measuring its variability in space and time over the globe provides insight into the overall response of the system to this forcing.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RES.	REQ. MEAS. UNCERT.	STAB.	STANDARDS/ REFERENCES
Top-of-atmosphere ERB longwave	Flux density of terrestrial radiation emitted by the Earth surface and the gases, aerosols and clouds of the atmosphere at the top of the atmosphere (W/m²)	Monthly (resolving diurnal cycle)	100km/NA	Requirements on global mean: 1W/m ²	0.2 W/m ² /decade	NOAA Tech Rep. NESDIS 134
Top-of-atmosphere ERB shortwave (reflected)	Flux density of solar radiation, reflected by the Earth surface and atmosphere, emitted to space at the top of the atmosphere (W/m²)	Monthly (resolving diurnal cycle)	100km/NA	Requirements on global mean: 1.0 W/m ²	0.3 W/m ² /decade	NOAA Tech Rep. NESDIS 134

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.



Total solar irradiance	Flux density of solar radiation at top-of-atmosphere (W/m²)	Daily	NA/NA	0.04%	0.01%/decade	
Solar spectral irradiance	Total Solar Irradiance (TSI); when measured as a function of wavelength it is the spectral irradiance (W/m²/μm)	Daily	Spectral resolution: 1 nm < 290 nm; 2 nm 290-1000 nm; 5 nm 1000-1600 nm; 10 nm 1600-3200 nm; 20 nm 3200-6400 nm; 40 nm 6400-10020 20000 nm spacing up to 160000 nm	0.3%(200-2400nm)	1% (200-2400nm) /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>

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.

