

Fire

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET



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

ECV IN BRIEF

Domain:	Terrestrial
Subdomain:	Biology
Scientific Area:	Biosphere
ECV Stewards:	Emilio Chuvieco-Salinero
Products:	Burned Area Active Fire Maps Fire Radiative Power



Fire

Fires have impacts on several identified radiative forcing agents. While they can be a natural part of many ecosystems, they have a strong human control, particularly in Tropical ecosystems. Fires contribute to the build-up of CO₂ through deforestation and forest degradation, emissions from peatland fires, and alterations of fire regimes (more frequent, larger or more severe fires). They also emit CH₄, and are a major source of aerosols, CO and oxides of nitrogen, thus affecting local and regional air quality. Estimates of greenhouse gas emissions due to fires are essential for realistic modelling of climate and its critical component, the global carbon cycle. Fires caused deliberately for land clearance (agriculture and ranching) or accidentally (lightning strikes and human error) are a major factor in land-cover variability and change, and hence affect fluxes of energy and water to the atmosphere.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RES.	REQUIRED MEASUREMENT UNCERTAINTY	STAB.	REF.
Burnt Area	Burned area means the area affected by the fire, including natural vegetation and croplands. X_area means the horizontal area occupied by X within the grid cell. The extent of an individual grid cell is defined by the horizontal coordinates and any associated coordinate bounds or by a string valued auxiliary coordinate variable with a standard name of region.	24 hours	30m	15% (error of omission and commission), compared to 30 m observations		None

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.



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Active Fire Maps	<p>Presence of a temporal thermal anomaly within a grid cell. Those thermal anomalies that are permanent should be linked to other sources of thermal emission (volcanos, gas flaring, industrial or power plants). Generally, the active fire maps are defined by the date/hour when the thermal anomaly was detected</p>	<p>6 hours at all latitudes from Polar-Orbiting and 1 hour from Geostationary</p>	<p>0.25-1 km (Polar); 1-3 km (Geo)</p>	<p>5% error of commission; 10% error of omission; Based on per-fire comparisons for fires above target threshold of 5 MW/km² equivalent integrated FRP per pixel (i.e. for a 0.5 km² pixel the target threshold would be 2.5 MW, for a 9 km² pixel it would be 45 MW).</p>	<p>None</p>
Fire Radiative Power	<p>Amount of energy released by area unit. Commonly it is expressed in W/m². This variable is a function of actual temperature of the active fire at the satellite overpass and the proportion of the grid cell being burned.</p>	<p>6 hours at all latitudes from Polar-Orbiting and 1 hour from Geostationary</p>	<p>0.25-1 km (Polar); 1-3 km (Geo)</p>	<p>10% integrated over pixel. Based on target detection threshold of 5 MW/km² equivalent integrated FRP per pixel (i.e. for a 0.5 km² pixel the target threshold would be 2.5 MW, for a 9 km² pixel it would be 45 MW).and with the same detection accuracy as the Active Fire Maps.</p>	<p>None</p>

Data Sources²

- ▶ Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate) <http://climatemonitoring.info/ecvinventory>
- ▶ Global burned area products generated under the Climate Change Initiative Programme of the European Space Agency <https://www.esa-fire-cci.org/>,
- ▶ Global burned area products generated by NASA <https://modis-land.gsfc.nasa.gov/burn.html>

Average global annual Burned Area

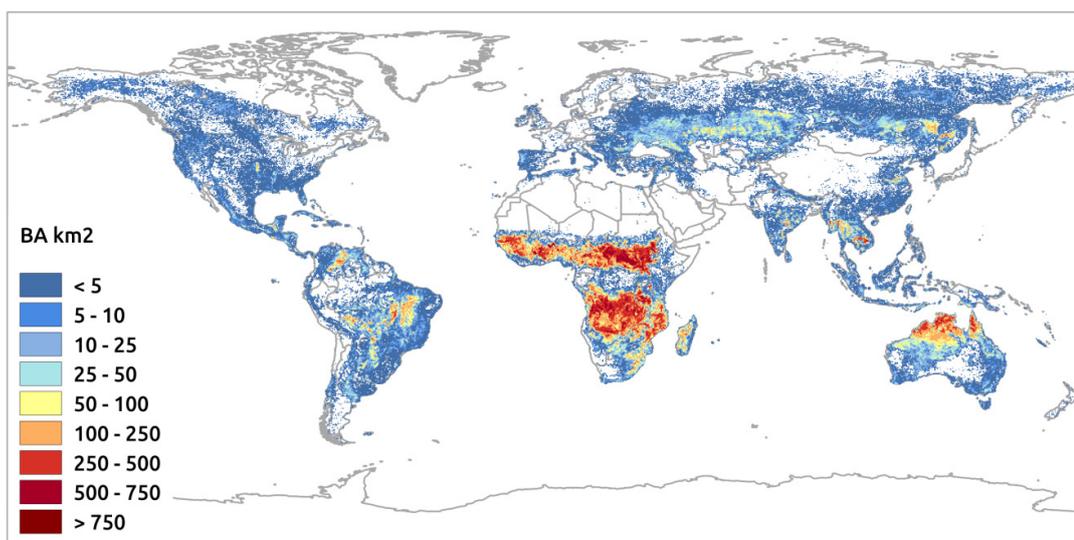


Figure: Average global annual Burned Area obtained from the FireCCI51 product for the period 2001-2017. Burned area detections were based on MODIS 250m near infrared reflectance and thermal anomalies (from Lizundia-Loiola et al., 2019, in review)

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.

