

# FIRE DISTURBANCE

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## OBSERVATIONAL IMPORTANCE

Fire is an important ecosystem disturbance with varying return frequencies, resulting in land cover alteration and change, and atmospheric emissions on multiple time scales. Fire is also an important land management practice and is an important natural abiotic agent in fire-dependent ecosystems. The Fire Disturbance Essential Climate Variable (ECV) consists of burnt-area maps, supplemented by active fires; High-Temperature Events (HTE); and Fire Radiated Power (FRP). Information on fire activity is used for global change research, estimating atmospheric emissions and developing periodic global and regional assessments, and also for planning and operational purposes (fire management, local to national) and development of informed policies (national and international, e.g. IPCC).

## OBSERVATIONS

Due to the large spatial and temporal variability in fire activity, satellite data provides the most useful means to monitor fire. There exist polar and geostationary systems with full operational status and experimental systems providing systematic observations that have been used for the creation of long-term data fire mapping. Major long-term global records of active

fires have been generated by ESA (ATSR World Fire Atlas) and NASA (TRMM and MODIS). Geostationary fire monitoring has been undertaken using GOES (WF-ABBA) and MSG SEVIRI (EUMETSAT Active Fire Monitoring). Future systems, such as NPP/NPOESS Visible Infrared Imager Radiometer Suite (VIIRS) and sensors on Global Monitoring for Environment and Security (GMES) Sentinel satellites and the provision of baseline high resolution fire observations for product validation should ensure the continuity of fire mapping and detection capabilities.

The only long-term burnt area dataset available at the moment is also partly based on active fire detections GFDE2, but true multi-year burnt area products are about to be released (MODIS, L3JRC, GLOBCARBON). Validation with *in situ* measurements is limited to only certain regions and is lacking, especially in developing countries. In other regions, calibration with high-resolution satellite data provides the best means for validation. Estimating emissions from these active fire detections or burnt areas has improved recently, with the use of biogeochemical models, but fails to capture fine-scale fire processes due to coarse resolutions. With the new burnt area products, this situation will probably be improved.



FAO/14186/R. Faidutti



FAO/13926/M. Marzot

## RELATED LINKS (BURNT AREA PRODUCTS UNDER DEVELOPMENT)

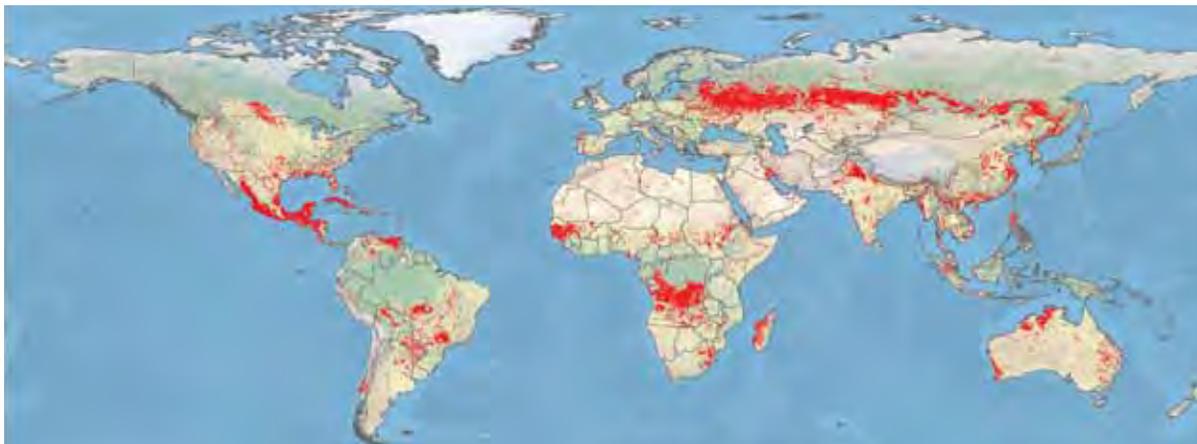
**L3JRC Global Burnt Area:** [www.tem.jrc.it/Disturbance\\_by\\_fire/products/burnt\\_areas/GlobalBurntAreas2000-2007.htm](http://tem.jrc.it/Disturbance_by_fire/products/burnt_areas/GlobalBurntAreas2000-2007.htm)

**MODIS fire products:** <http://modis-fire.umd.edu/products.asp> | **Globcarbon:** [www.fao.org/gtos/tcopjs4.html](http://www.fao.org/gtos/tcopjs4.html)

**GFDE2 Existing multi-year burnt area and emissions:** <http://ess1.ess.uci.edu/%7Ejranders/data/GFDE2>

**The Fire Information for Resource Management System (FIRMS):** <http://maps.geog.umd.edu/firms>

# Global monitoring of fire activity for fire management, policy-making and research



Global distribution of MODIS active fire detections for May 2006 from the FIRMS system  
(Source: MODIS Rapid Response <http://rapidfire.sci.gsfc.nasa.gov> Fire Information for Resource Management System (FIRMS) <http://maps.geog.umd.edu>)

## DATA SYSTEM

A number of products are accessible through Web-based distribution systems, ranging from simple file distribution to complex visualization and search utilities using Web GIS. For example, the University of Maryland, in collaboration with NASA, FAO and Conservation International, is developing the Fire Information for Resource Management System (FIRMS); an integrated data system for easy access (through the Web, e-mail and mobile phone) of various data products.

## STAKEHOLDERS

There is a need for coordination to improve access to fire data and its use for resource managers, policy-makers and the scientific community, and to secure long-term fire observing systems. The Fire theme of GOF-C-GOLD is working on harmonization of remote sensing and *in situ* observations. This includes the development of capability for periodic global assessments of fire, and a contribution to GEO tasks by capacity building for space-based fire observations, developing a global early wildland fire warning system and a global fire monitoring network from geostationary satellites.

The UNISDR Global Wildland Fire Network and the Wildland Fire Advisory Group, facilitated by the Global Fire Monitoring Center (GFMC), is working on improving fire management capacity around the world. Many stakeholder organizations are members of the recently established Fire Management Actions Alliance.

## COOPERATION REQUIRED

Collaboration between a number of agencies and programmes is needed to ensure the optimum provision and use of fire information. Increased involvement of space agencies in fire observations and monitoring is pursued through CEOS and CGMS. GOF-C-GOLD is a main actor in creating the required regional networks of data providers and users to capture regional-specific information needs and priorities and to provide local expertise for product validation.

## STANDARDS

Various algorithms exist for burnt area mapping. Active fire (HTE) detection is performed based on consensus approaches, with necessary sensor-specific modifications. Approaches for the measurement of FRP are at the research and development stage. Protocols for burnt area validation and reporting exist and are under development for active fire detection and FRP in collaboration with CEOS.

## FUNDS

A coordination mechanism for multiple contributory activities and the maintenance of regional networks would require approximately US\$150 000 annually. Specific activities, such as the coordination of a global geostationary fire monitoring network, the development of global fire assessments, and the creation of data portals for products and validation data, require further funding, amounting to US\$50 000 each annually.

## OTHER RELATED LINKS:

**Global Fire Monitoring Center:** [www.fire.uni-freiburg.de](http://www.fire.uni-freiburg.de) | **Fire management actions alliance:** [www.fao.org/forestry/site/41315/en](http://www.fao.org/forestry/site/41315/en)  
**Fire disturbance standards:** [www.fao.org/gtos/ECV-T13.html](http://www.fao.org/gtos/ECV-T13.html) | **GOF-C-GOLD Fire:** <http://gofc-fire.umd.edu>