

GOFC - Fire

Satellite Product Validation Workshop

Gulbenkian Foundation
9 - 11 July 2001
Lisbon, Portugal

EXECUTIVE SUMMARY

The Global Observation of Forest Cover (GOFC)-Fire Satellite Product Validation Workshop was held at the Gulbenkian Foundation, Lisbon, Portugal, July 9-11 2001. The Workshop was organised by the Instituto de Investigação Científica Tropical, in collaboration with the Space Applications Institute, Joint Research Centre, the Department of Geography, University of Maryland, NASA and the European Space Agency/ESRIN. The objectives of the GOFC-Fire Satellite Product Validation Workshop were:

- To provide an update on developments within GOFC and to review and refine the GOFC-Fire Implementation Goals;
- To provide a forum for presentation of recent developments and results on satellite fire product validation, and to explore opportunities for international validation coordination;
- To establish a fire validation group jointly with Committee on Earth Observation Satellites Land Product Validation (CEOS LPV) and to develop an agenda for LPV fire activities.

The initial session of the Workshop included presentations on the purposes of the GOFC-Fire; the work of the Interagency Task Force Working Group on Wildland Fire, of the UN International Strategy for Disaster Reduction; the interaction between GOFC-Fire and the newly formed CEOS Land Product Validation Working Group; and a perspective on fire product needs of the carbon cycle atmospheric chemistry research communities.

This was followed by a technical session with presentations on the status and results of active fire product validation activities, which covered some of the major ongoing global initiatives, such as the JRC's World Fire Web, and ESA's World Fire Atlas. Initiatives based on the

DMSP, MODIS, and TRMM sensors were also presented, as well as validation and data comparison exercises for Brazil, Africa, and the boreal forest biome.

The second technical session addressed the current status of product development and validation results for burned area products. Presentations were structured around major international initiatives (GBA 2000, SAFARI 2000, Globscar), and also covered other product development and validation work being done in North America and Australia. Overviews of the main objectives and validation strategies for these initiatives were complemented by case studies covering tropical biomes in Africa, Australia, and Brazil, and boreal biomes in Siberia and Canada.

Breakout sessions were organised, for in-depth discussion of relevant topics, namely:

1. Defining LPV – Fire activities, namely the development of a global network of fire validation sites, and the development of active fire and burned area validation protocols and reporting guidelines
2. Refining GOFC-Fire goals and implementation steps
3. Assessing progress on recommendations from previous GOFC-Fire meeting, and developing recommendations from the Lisbon meeting

The purpose for developing a global network of fire product validation sites is to provide a focus for satellite, aircraft, and ground data collection for the validation of active fire and burn scar products. In addition these sites would be used for algorithm intercomparison and the development and testing of new or improved sensing systems or fire products. The network will engage in long-term fire monitoring, in support of algorithm development, testing and validation. It is meant to facilitate access to and sharing of existing continuous data sets, and the development of new ones, for time-series analyses of fire occurrence. Such a network of sites will provide international cost-sharing opportunities. Selection of network sites will aim at representative coverage of biomes with significant fire activity, and will rely as much as possible on existing regional and thematic networks, such as the World Fire Web partner institutions, the World Fire Atlas validation participants, the MODIS fire validation sites and national fire inventories.

Data collected at the network of validation sites will be particularly useful if it can provide a “one-stop-shopping” opportunity for those interested in fire product development/evaluation.

This requires the development of a minimum set of guidelines for the reporting and validation of fire data. The breakout group discussed which data types are considered adequate for fire product validation, the size of validation areas and minimum mapping unit, desired accuracy levels of reference data, adequate statistical measures of mapped product accuracy, and product comparison and integration methodologies.

Revision of the goals for GOFC-Fire highlighted the improvement of links to users as a key issue. It was considered important to improve the quality, scope, and utility of GOFC-Fire inputs to the various user communities through:

- gaining a better understanding of the range of users of fire data, their needs for information, how they might use such information if it was available, and with what other data sets such information might be linked;
- increasing the awareness of users with respect to the potential utility of satellite products for global change research, fire policy, planning and management; and,
- based on ongoing interaction with representatives of the various user communities developing enhanced products.

Emerging opportunities to implement such objectives were identified through interaction with, or involvement in various international programmes. Development of a consensus on methodologies and procedures for documenting and reporting fire at a range of scales may be pursued in collaboration with the Interagency Task Force on Disaster Reduction, namely through the establishment of a common network of regional nodes. FAO's Forest Resource Assessment 2010 will benefit from improved fire data and products, in order to better analyse the role of fire in changing forest cover. Long-term trends and implications of changing fire regimes are of interest to the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report, and to the UNEP's Global Environment Outlook initiative. Finally, the current status of recommendations from the previous GOFC-Fire Meeting, held at the Joint Research Centre, in Ispra, Italy, in November of 1999 was assessed, and new recommendations were formulated.

In order for GOFC-Fire to further contribute towards implementation of the GOFC goals, the following initiatives are needed:

1. Following successful experiences e.g. in Brazil, Canada, Russia, ASEAN countries, and Portugal, GOFC-Fire should promote the development and testing of prototype operational algorithms for active fire detection and burned area mapping, and the pre-operational testing on a "trial run" basis of similar systems in other countries/regions, through workshops and bilateral arrangements.
2. GOFC-Fire should:
 - work to define the advantages and disadvantages of different sensors and products, especially with respect to the limitations of the existing low-resolution fire products;
 - make this information widely available, through the GFMC among other channels;
 - develop metadata and product standards for regional network products, to help build consistent global products.
3. GOFC-Fire should develop targeted activities with GOFC Regional Networks to enhance the flow of data between producers and GOFC Regional data brokers and users, and take a lead role in providing information related to ecosystem stability and atmospheric chemistry, notably the global carbon cycle and air pollution affecting human health.

The following series of actions is requested from space agencies and data producers:

4. Through CEOS and IGOS, ensure that requirements for fire monitoring are included in the criteria for the design of future operational systems (*e.g.* NPOESS, METOP), and that information on fire (detection and mapping of active fires; burn scars; estimates of aerosol and gas emissions) is provided in the form of operational products.
5. Support the maintenance of historical ("heritage") Earth Observation time-series data, improve their accessibility and facilitate the use of these data to support long-term global change research.
6. Support the development and maintenance of a global network of fire validation sites; support the development of standard procedures and protocols for fire product validation; develop and publish accuracy assessments for each of their fire products, in a timely fashion. We recommend that the coordination of these activities be undertaken through the CEOS Land Product Validation Group.
7. Provide satellite data necessary to achieve the goals of GOFC-Fire, in assisting in the determination of the accuracy of fire products, in promoting informed use of satellite fire

data, and developing improved product suites to meet user requirements, including multi-sensor products.

It is considered very important for GOFC-Fire to strengthen the links with the fire data user community. This requires:

8. That more effort be made by GOFC-Fire to develop direct collaboration and invite participation/inputs from the three targeted user communities, i.e. natural resource management, global change research (atmospheric chemistry, carbon cycle, ecosystem disturbance), and policy makers. In particular, future GOFC-Fire workshops should specifically address refining the requirements of the fire emissions modelling community, and the fire management community.
9. That GOFC-Fire works with the user community, to better define operational requirements for future monitoring aspects of planned systems, such as the NPP-VIIRS (USA), SSR (Brazil) and the Focus instrument on the International Space Station (ISS), and satellites such as Fuego, based in part on experience gained from operational and experimental systems such as GOES, DMSP, AVHRR, MODIS, SPOT Vegetation, and ATSR.
10. Based on the assessment of user needs, GOFC-Fire should define specifications for enhanced product suites, combining satellite and *in-situ* data and model output on fire emissions. For example, linking satellite burned area data with fuel loads data, moisture content, fire intensity, fire severity, fuel consumption, flaming versus smoldering combustion, fire damage, emissions factors, and emissions rates.
11. That GOFC-Fire works with the UN ITDFR, to encourage individual countries to establish mechanisms for collating national information on fire and assessing its significance. GOFC needs to facilitate further development through identifying appropriate technologies and products, and helping articulate needs to funding agencies.

In the final session of the workshop, the meeting endorsed a proposal to hold the next Annual GOFC-Fire Workshop at the University of Maryland in the summer of 2002 on the topic of Atmospheric Emissions from Biomass Burning: Modeling and Comparisons with Satellite, Ground and *In Situ* Observations.

LIST OF ACRONYMS

ASEAN	Association of Southeast Asian Nations
ATSR	Along Track Scanning Radiometer
AVHRR	Advanced Very High Resolution Radiometer
CEOS	Committee on Earth Observation Satellites
DMSP	Defense Meteorological Satellite Program
ESA	European Space Agency
ESRIN	European Space Research Institute
FAO	Food and Agriculture Organisation
GBA 2000	Global Burned Areas 2000
GFMC	Global Fire Monitoring Centre
GOFC	Global Observation of Forest Cover
IGOS	Integrated Global Observing Strategy
IPCC	Intergovernmental Panel on Climate Change
ISS	International Space Station
ITFDR	Inter-Agency Task Force for Disaster Reduction
JRC	Joint Research Centre
LPV	Land Product Validation
METOP	Meteorological Operational (polar satellites of the European Organisation for the Exploitation of Meteorological Satellites, EUMETSAT)
MODIS	Moderate Resolution Imaging Spectrometer
NASA	National Aeronautics and Space Administration
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP-VIIRS	NPOESS Preparatory Project - Visible/Infrared Imager Radiometer Suite
SAFARI2000	Southern Africa Fire-Atmosphere Research Initiative 2000
SPOT	Système Probatoire d'Observation de la Terre
SSR	Satélite de Sensoriamento Remoto (Remote Sensing Satellite, Brazil)
TRMM	Tropical Rainfall Measuring Mission
UN	United Nations
UNEP	United Nations Environment Programme