Establishing validation site network for remote sensing applications to fire research: a joint activity between GOFC-Fire and the LPV subgroup

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The International Geosphere-Biosphere Programme Data and Information Services (IGBP DIS) working group meeting on remote sensing of fires, held in Toulouse on March 19-20 1998, discussed the need for establishing a number of long-term fire and burnt area validation sites and a network of researchers at these sites. This concept was reinforced at the joint Global Observation of Forest Cover (GOFC)/Committee on Earth Observing Satellites (CEOS) Land Product Validation (LPV) "Fire Satellite Product Validation Workshop" in Lisbon, Portugal, July 9-11, 2001; where there was consensus agreement on the need for a common set of validation sites to serve as a basis for validation of remote sensing applications to fire research at a global scale. These remote sensing applications include (a) detection of active fires (b) assessment of burnt area, (c) estimation of combusted biomass/carbon and (d) estimation of gas emissions from fires. Other applications may be envisaged as well.

Such validation sites would allow evaluation/validation of how methodologies and algorithms perform in different parts of the world and relative to each other.

Criteria for selecting validation sites

It was agreed that a satisfactory set of validation sites must be selected on the basis of the following criteria:

(1) The biomes most affected, contributing most to emissions and/or representing the largest sources and sinks of carbon must be well represented

(2) Different size distributions of fires and different fire types must be represented

(3) Areas dominated by different land uses - agriculture, forestry, livestock grazing, national parks - should be included. Zones experiencing land cover change would also be suitable

(4) Sites for which substantial historical and current data sets are available, and where active fire remote sensing groups are concentrating efforts, will have to be selected, in order to assure that long term commitment to continuous collection of ground truth and satellite data is present. The participants at these sites should be willing to share data within the network of fellow participants.

Data to be collected for each site

Satellite data

In order to obtain as much satellite data coverage as possible for the validation sites, the Land Product Validation subgroup should work with the CEOS Working Group on Information System and Services (WGISS) to take steps to assure centralized easy-access to data from a range of satellite/sensor products provided by CEOS members. This may involve responding to Announcements of Opportunities solicited by CEOS Members.

The initial products to be subset and made available for each site include:

- World Fire Atlas produced by European Space Agency (ESA)
- World Fire Web produced by the Joint Research Centre (JRC)
- Defense Meteorological Satellite Program (DMSP) Fire products produced by US National Oceanic and Atmospheric Administration (NOAA)
- MODIS active fire produced by US National Aeronautics and Space Administration (NASA)

Subsequent products would include:

- MODIS burn scar, by NASA
- Global Burnt Area 2000 (GBA2000), by JRC
- GLOBSCAR: ATSR World Burnt Surfaces Atlas, by ESA

CEOS members will be solicited to provide high resolution satellite products (such as ETM+ and SPOT) over the sites at no or minimal cost. In addition to fire related products, an attempt should be made to collect a globally consistent set of ancillary data, such as land use, land cover and land cover change, vegetation characteristics, rainfall, topography, etc.

Field data and high resolution fire and burn scar maps

Assuming that major external funding for carrying out extensive and coordinated collection of field data is not available, establishment of a standardized set of data for each site is not a realistic goal. As a minimum, high resolution fire or burnt area products (from SPOT, Landsat TM, ...) covering the area should be provided by the "site contact". To the furthest extent possible, these high-resolution products should be accompanied with a statement on their accuracy. That is, the high-resolution products should be validated.

For most validation sites the data available will depend on the activities of the individual fire remote sensing groups working in the area. Attempts to standardize measurement protocols between research groups working on the different sites would be useful. A report/paper documenting a standardized protocol is being addressed as an action item from the Lisbon '01 meeting. A standardized protocol is intended not as a strict requirement but as a suggested baseline method to guide participants. Deviations or modifications to the protocol would be allowed. However, it should be possible to

document how and why a given activity did not adhere to the suggested protocol.

All data should be accessible via the Internet (or on CD for collaborators with limited Web access).

The size of the sites is suggested to be in the order of one high resolution satellite image, e.g. 50 to 200km on a side. Where fire is less frequent or where cloud cover may limit data, it may be necessary to subset larger areas for the Global products and acquire high-resolution data/field work from a moving window within that larger subset area. It might be useful to allow for a smaller "practical" subset area where field validated high resolution products are available. That is, it may not be feasible to produce accurate and validated high-resolution products for an entire high-resolution image. A subset within the high-resolution scene, on the order of ~50km by 50 km should be acceptable.

Suggested sites

The initial phase of this activity will attempt to establish an infrastructure to gather field data and related satellite products as well as provide a web-based system to exchange these data. This will involve 5-10 sites where there is an existing commitment to collect field data and produce high-resolution fire and/or burn scar products. After the initial stage, additional site can be added in an attempt to cover the major biomes relevant for Fire/Burn Scar/Emissions research. A list of biome and contacts are:

Boreal forest: (contacts: Eric. Kasischke, Brian Stocks)
Mediterranean (contacts: Emilio Chuvieco, Jose Pereira)
Semi-arid Savannas and Grasslands (contact: Jeremy Russell-Smith)
Temperate forest (contact: Wei Min Hao)
Tropical savanna (Contacts: Kjeld Rasmussen, David Roy, Joas Pereira, Jeremy Russell-Smith)
Tropical forest (contacts: Mastura Mahmud, Johann Goldammer, Joas Pereira)
SE-Asia forest & croplands (contacts: Mastura Mahmud, Johann Goldammer, Chris Elvidge)

Management structure

To help manage the workload associated with this activity, it is proposed that the effort be distributed among several individuals working within the GOFC/LPV network.

GOFC-Role
(The following positions are to be appointed through the GOFC-Fire Team.)

Each site would have a "*Site Contact*" responsible for providing accurate coordinates for the site, any other baseline information, and the high-resolution fire or burned area maps for the site.

The local site activities would be coordinated through the "*Sites Coordinator*" responsible for maintaining the list of participating sites and contacts for each site.

For a site to be included in this activity, there should be letter of commitment from each "Site Contact". This letter should include:

- a commitment to provide high resolution fire or burn scar products
- the specific coordinates for the sites,
- the suite of field data and high resolution imagery that is or will be collected, and
- the relevant dates of high-resolution fire or burn scar mapping.

The "Sites Coordinator" should maintain these letters and they will serve as the basis upon with the "Satellite Data Coordinator" will incorporate a site into the infrastructure used to collect and distribute the satellite products.

LPV-Role
(The following position is to be appointed through the LPV Team.)

A "*Satellite Data Coordinator*" would be responsible for the collection and centralized distribution of the satellite data and subsets of global fire and burn scar products.

LPV will coordinate with a main contact for each of the fire/burn scar products:

- World Fire Atlas, Olivier Arino
- World Fire Web, Jean Marie Gregoire
- Defense Meteorological Satellite Program (DMSP) Fire products, Chris Elvidge
- MODIS active fire products, Louis Giglio

- MODIS burn scar, David Roy
- Global Burnt Area 2000 (GBA2000), Jean Marie Gregoire

- GLOBSCAR: ATSR World Burnt Surfaces Atlas, Olivier Arino
- BIRD fire and burn scar products, TBD

DRAFT letter of commitment to participate within the

Global Observation of Forest Cover / CEOS Land Product Validation subgroup

GOFC/LPV Fire & Burn Scar Validation Network

Site Name:
Site Contact:
Site Contact's affiliation:
Major Biome:

Site location:
Central lat/long:
Bounding box coordinates
Country:

General description of site:

Primary purpose of fire monitoring at site:

High-resolution products to be derived for the site:
(check all that apply)
_ Active fire/hot spot
_ Burnt area
_ Combusted biomass/carbon
_ Gas emissions from fires

Date window for high-resolution products:

Acknowledgement:
By submitting this form, the site will be considered for inclusion of the GOFC/CEOS Fire Validation site network. As part of the network, special consideration will be given to the site for provision of high-resolution satellite data and subsets from global products. In return, it is expected that high-resolution products derived by the site contact, their institutions or collaborators, will be available to other researchers working within this network. Submitting this form indicates that you agree to provide high-resolution products from your site within a reasonable time of their production (within 6 months). While there is no formal method to enforce this agreement, sites failing to cooperate within the network will lose any special data provisions as secured through this network.