GOFC-GOLD

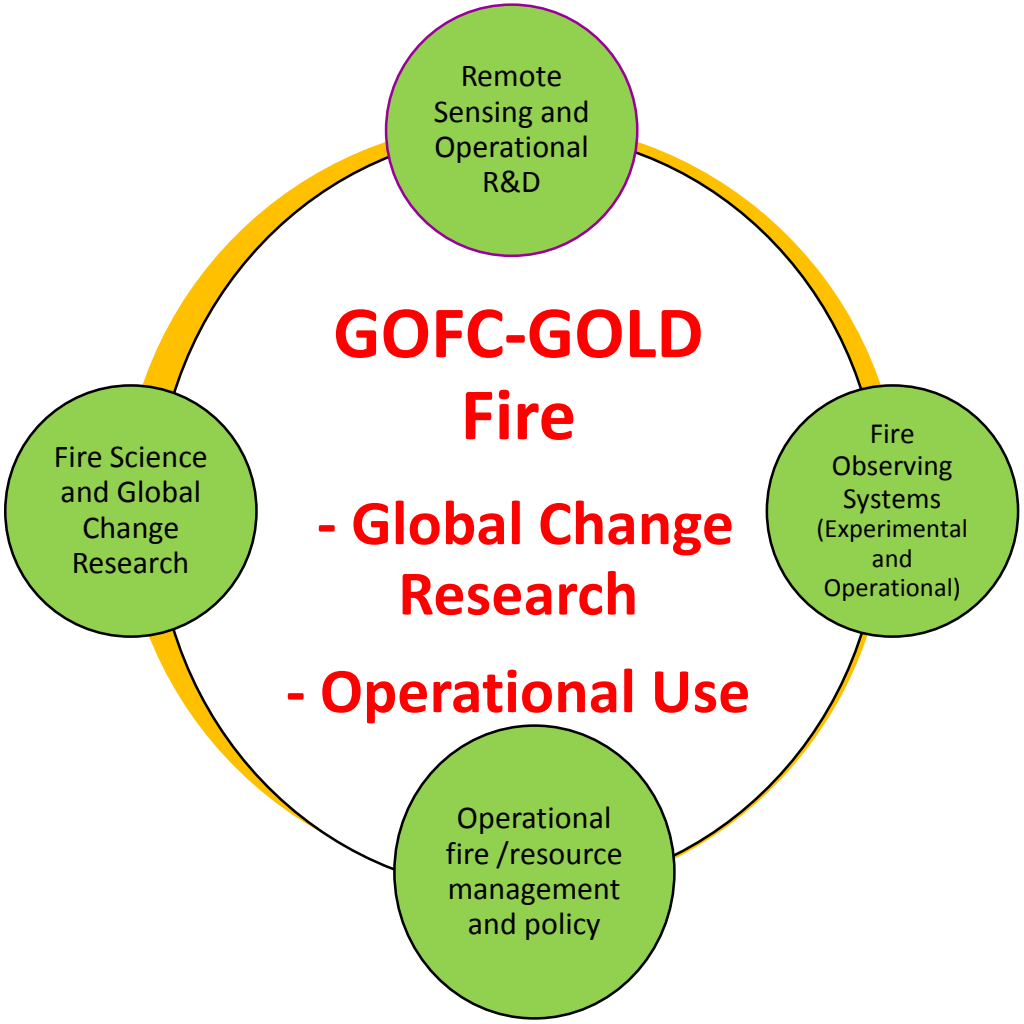
Global Observation of Forest and Land Cover Dynamics

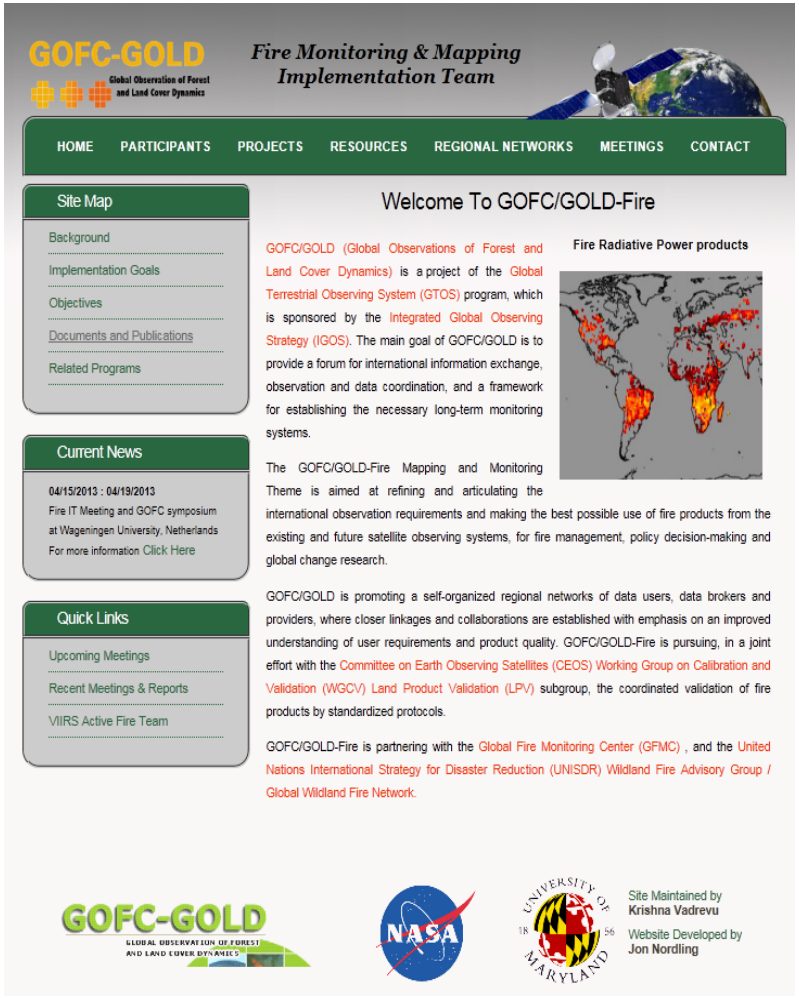
Fire-Implementation Team (Fire-IT) Update and Future Steps

Fire-IT Co-Chair:
Chris Justice (U. Maryland)

Fire-IT Executive Officer:
Krishna Vadrevu (U. Maryland)

The GOFC-GOLD Fire Community





http://gofc-fire.umd.edu/

Organization of GOFC-GOLD Fire

GOFC – GOLD Executive Committee (Tony Janetos, Chair)

Fire Implementation Team

Co-Chairs: Chris Justice, UMd and Johann Goldammer, GFMC

Fire IT Exec. Officer: Krishna Prasad Vadrevu, UMd

Fire IT Members: Olivier Arino, Luigi Boschetti, Alessandro Brivio, Emilio Chuvieco Ivan Csiszar, Philip Frost, Louis Giglio, Bill de Groot, Anja Hoffmann, Eckehard Lorenz, Tim Lynham, David Roy, Jesus San-Miguel-Ayanz, Michael Schmidt, Wilfrid Schroeder Kevin Tansey, Guido van der Werf, Martin Wooster.

Regional Networks (w. Fire Emphasis)

Coordinator: Anja Hoffman

Regional Networks:

Philip Frost (SAFNET), Jesus Acevedeo (REDLATIF), Ionnis Gitas (BALKAN Netw.), (SEARRIN)

International Strategic Partnerships e.g. START, UN ISDR Wildland Fire Network, CGMS, TOPC, CEOS LPV, GEO Wildfire, EARSEL SIG-Fire, ILDRCC, UN FAO

GOFC/GOLD-Fire IT Goals

Promoting:

- **Data and Service Continuity and Long-Term fire data records**
  - **Operational polar orbiters (coarse and moderate resolution) with adequate fire monitoring capability**
  - **Establishment of a geostationary global fire network**
- **Assessment of Fire Product Accuracy and Quality**
- **Global Fire Early Warning Systems > operational products**
- **Use of EO in fire emissions product suites**
- **Improved fire data and information systems**
- **Enhanced user products and services**
- **Experimental fire observing systems and related research**
- **Increased user awareness of EO fire data**

Fire IT Program Scope

- **Spaceborne Assets (Space Agencies)**
- **Derived Data and Information Products (Science Community)**
- **Data Policy, Access and Distribution (Space Agencies and Data Providers)**
- **Capacity Building for Improved Data Utilization (Users)**

GOFC Fire IT Meeting (July 29-31st, 2014), NOAA Center

Summary published in The Earth Observer, (Jan-Feb, 2015, 29-33 Pp).

Areas of Recent Attention

- **Spaceborne Assets**
  - Fire Monitoring with next generation Operational Polar Orbiters > Data Continuity (e.g. VIIRS, JPSS1, Sentinel 3 SLSTR)
  - Moderate Resolution Data Continuity (e.g. Landsat 8, Sentinel 2, ResourceSat, CBERS4)

- **Data and Information Products**
  - Regional / Global Burned Area Products Generated (NASA MODIS C6, ESA CCI)
  - Systematic Global BA product validation (e.g. MODIS CEOS LPV Stage 3 – REFINED DEFINITION)
  - Moderate Resolution (Landsat Class) derived and validated fire products
  - Multi-source fire data fusion and information integration (e.g. AFIS, MUSLI)

- **Data and Information Access and Distribution**
  - Global WildFire Information System (GWIS) (JRC/EC) – GEO TASK GI 09
  - Near Real-Time Global Daily Active Fire Monitoring (e.g. NASA VIIRS LANCE)
  - Web-based Fire and Imagery Distribution Systems (e.g. FIRMS, WELD)

- **Capacity Building for Data Utilization**
  - Regional Fire Networks – workshops and initiatives (e.g. SAFNET, CARIN, BALKAN Network, SEARRIN etc.)

Recent Fire IT Project Office Contributions

- Currently, NASA is supporting the GOFC-Fire IT Office at UMd.
- Providing inputs for developing specific tasks – most recently
  - GEO Wildfire - GEO Workplan DI-01-C4 Component of Task DI-01: Informing Risk Management and Disaster Reduction;
- Providing inputs to international meetings and partner programs – eg IBBI (GOFC-Fire presentation; EARSEL, UNISDR meeting inputs).
- Outreach and communication through Website, Email exchange, telecons, meeting summaries e.g. Earth Observer articles
- Working with START and NIES on regional network coordination and workshops – with special editions

Recent Project Office Contributions..

- Apart from Fire-IT meetings, project office facilitating fire-related research sessions/meetings – can assist in mobilizing funds and resources with IT members

  - **RedLatif Meeting – Satellite based fire products and their validation in Latin America (INPE, Brazil, November, 16-21, 2015)**

  - **SEARRIN-International Workshop on Air Quality in Asia (Bogor, Indonesia, 2015)**
    -Outputs – special issue for 'Environmental Pollution' (In press).

  - **SAFNET meeting (February, 2013; *August, 2014)***

  - **SEARRIN Fire-Air Quality meeting with NIES, (Hanoi, Vietnam, June, 2014);**
    - Outputs – special issue for 'Environmental Research Letters' (Published)

New Fire Observations

- **VIIRS Suomi NPP > JPSS1 and JPSS2**
  - Improved I band capability for detection > VIIRS LANCE NRT in development
  - NASA VIIRS AF product (2016) – continuity w. MODIS C6 inc. FRP
  - Burned Area – continuity w. MODIS C6 (TBD)
  - Evolving NOAA NDE products for fire
- **Sentinel 2 MSI**
  - Current issues of data acquisition and bulk data access
  - EDC Archive coming on line
  - NASA/ESA L8/S2 Initiative – increased frequency - *joint science team meetings* for funded PI's and partnering on proposals – Roy et al. Southern Africa Fire.

MODIS and LANDSAT Products

- **MODIS 6 Collection Products Refinements ongoing**
  - Improved thresholds to detect small fires, gas flares, etc.
  - Improved cloud mask
  - Updated FRP retrieval

- **LANDSAT 8 Burned Area Products**
  - Prototype Landsat resolution burned area maps are being developed by the community (Boschetti, Roy et al)
  - Exciting potential for continental to global scale, and long - term, 30m burned area products

New Fire Observations

- **Sentinel 3 SLSTR (**Sea and Land Surface Temperature Radiometer)
  - High inclination orbit (98.65°) near-polar, sun-synchronous orbit with a descending node equatorial crossing at 1000 Mean Local Solar time
  - Dual view swath of 1400 km for nadir view and 740 km width for oblique view defined at 55°
  - Products are available either in NRT (Near Real Time), provided to the user within three hours after sensing, or in NTC (Non Time Critical) typically within 48 hrs - NetCDF and XML metadata
    - https://sentinel.esa.int/web/sentinel/sentinel-data-access
  - Dual-gain, 1 km resolution, 4 channels, 2 fire (low-gain), S7 MIR 3.7 vs. MODIS (3.9 µm), S6 SWIR (2.25 µm) channel 500 m to be used at night to improve small fire detections

Sentinel-3 SLSTR: Active Fire (AF)

- AF detection and characterization algorithm is a 6-stage, self adapting approach **only** using the nadir facing channels (Wooster et al.)
  - ~1 day repeat cycle at the Equator (1.9 days when using nadir and oblique facing duel-view)
- Spatial filters from Geostationary algorithm (e.g. SEVIRI) used to constrain # of potential fire pixels passed to the next test.
- **Simulation study showed 36% more AF detections compared to Terra-MODIS (Wooster et al., 2012)**
- **Improved detection of small/low-FRP fires.**
  - While the contextual algorithm is similar to MODIS, spectral tests are less conservative.

Ellicott

Strategic Priorities for GOFC/GOLD-Fire IT

- **Operational fire monitoring capabilities on JPSS VIIRS and METOP, Sentinel 3 SLSTR providing data and product continuity (NOAA/ESA/NASA) including - Near Real Time access to the data**
- **Global Burned Area Products and Validation (Stage 3) – Best Practices - NASA/ESA CCI**
- **Space Agency coordination of global moderate resolution data processing and access (Landsat 8, Sentinel 2 (NASA/ESA/USGS), China/Brazil, India (TBD) – MUSLI demonstration**
- Meteorological Agency support for establishing a Global Geostationary Fire Network (NOAA/CGMS)
- **Coordination / refinement of requirements of fire observations in support of the International Conventions and articulating implementation methods / best practices**
  - **Role of Fire in UN REDD (i.e. GOFC-GOLD REDD Sourcebook (U. Idaho w. LC IT U. Wageningen),**
  - **UN REDD + Fire Demonstration Projects (TBD)**
  - **GCOS ECV's for UN FCCC , CEOS (U. Leicester)**
- **Support for the Regional Fire Networks and developing capacity building programs on the use of satellite fire data (START, NIES, NASA)**

Important issues being considered..

- Promoting open data policies – emphasis shifting to ground segment efficiency, product generation and interuse of data
  - Emphasis needed on Best Practices; ease of volume data access, QA metadata, documentation, validation, reprocessing, etc.
- Data records are extending but multisource Long Term Global Data Records remain challenging
  - AVHRR 1km back to 1980 – no initiatives on the horizon – strong justification needed to warrant the cost
  - ATSR 21 year record (night-time fires)
  - MODIS Reprocessing C6 > VIIRS Products and Reprocessing
  - Sentinel 2/3 Products – Standard Higher Order Products TBD
- Agricultural Burning – remains an outstanding challenge
  - Both for detection and emissions

Forthcoming GOFC Fire-IT meeting w. GEO GWIS November 2016, Chile