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

- Global Change Research
- Operational Use

Remote Sensing and Operational R&D

Fire Science and Global Change Research

Fire Observing Systems (Experimental and Operational)

Operational fire/resource management and policy

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 Hoffmann
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

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 – e.g. 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
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
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](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.
**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