GOFC/GOLD IT Fire Overview

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GOFC/GOLD Fire IT Co-Chair

Purpose of the IT Meeting

- What has been accomplished?
- What needs to be done next?
  - STRATEGIC
- Where should we put our near term efforts?
  - TACTICAL

  - Last Full IT Meeting. Montreal, Feb 2005
  - IT Sub-group Meeting, Thesalonoki, 2008

Review Functions of the Fire IT

- Developing a connected fire observation community with a common agenda for advancing the community goals
- Refining and articulating the international requirements for fire related observations
- Promoting the free and open provision of high quality derived data fire products – to meet both science and applications user needs
- Increasing access to and encouraging the best use of fire products from existing (and future) satellite observing systems, for fire management, policy decision-making and global change research
- Promoting 1) the provision of long-term, systematic satellite observations necessary for the production of the full suite of recommended fire products and 2) the development of new technologies for fire monitoring

The Organization of GOFC/GOLD Fire

Scientific and Technology Board

GOFC – GOLD Executive Committee

Fire Implementation Team -
Activities and Contributory Projects

Regional GOFC Networks and Fire Activities (e.g. SAFNET, REDLATIF, WARN, SEARRIN, NERIN, *CARIN*)

Strategic partnerships e.g. START, UN ISDR Wildland Fire Network, EARSEL SIG-Fire, CGMS, CEOS and LPV, ILDRCC, GEOSS

GOFC/GOLD Regional Networks

- The Regional Networks have developed to highlight **regional priorities** and requirements for operational fire observations and establish improved communication between fire data users and fire researchers.
- Forum for data producers and **regional users** to interact to assess current data availability and existing data collection systems and proven research
- Mechanism for lateral transfer of technology and applications experience
- Mechanism for involving regional scientists and users in new product accuracy assessment (validation)
- Focus of the GOFC Regional Fire Networks is on fire observations and monitoring
- Complement the emerging UN Regional Fire Networks which are focusing on fire management, policy and training
- Forum for satellite data providers, global change and resource managers to improve communication

Working Group on Calibration & Validation

CEOS

Land Product Validation Subgroup

(Validation = independent Accuracy Assessment)

Established in 2000
as a subgroup of the
Committee on Earth Observing Satellites:
Working Group on Calibration/Validation

Linked through
www.wgcvceos.org

LPV Fire Co- Chairs : Kevin Tansey, Luigi Boschetti

Product Status Reporting

- Increasing attention given to product status and accuracy assessment and reporting– signs of a maturing community
  - What products are available and how good are they?
- System proposed by CEOS WGCV LPV for product status
  - **Beta –** algorithms run, known problems with the data set
  - **Provisional –** product generated but unvalidated, includes product evaluation and "confidence building" by intercomparison with other unvalidated data sets or visual inspection
  - **Validated** (using independent data sets of known accuracy, results published in peer reviewed literature)
    - **Stage 1 – at a few locations, targets of opportunity**
    - **Stage 2 – over a representative range of observation conditions**
    - **Stage 3 – systematic, statistically robust sample in space and time**

Organization Sponsorship

- GOFC GOLD Chair – (NASA)
  - Tony Janetos - (PNL)
- GOFC – GOLD Secretariat (CSA and Canadian Forest Service / Natural Resources Canada)
  - Michael Brady, (CFS) Executive Director
- Regional Network Support (Host institutions and NASA START - Garik Gutman)
  - Olga Krankina OSU (Network Coordinator)
- Land Cover IT Project Office (ESA – Olivier Arino)
  - Chris Schmullius (U. Jena) > Martin Herold (U. Wageningen)
- Fire IT Project Office (NASA – Garik Gutman)
  - Chris Justice (UMd)
  - Krishna Vadrevu (UMd) Exec Officer (Replacing Ivan)

A BIG THANK YOU TO IVAN CSISZAR FOR HIS ROLE AS THE PREVIOUS FIRE IT EXECUTIVE OFFICER

IT Approach

- Identify ‘community’ goals
- Pursue and promote enabling conditions and activities to achieve these goals
- Periodic revisiting of the goals, identification of gaps and priorities

Current GOFC/GOLD-Fire IT Goals

- **Increase user awareness and data use**
  - develop an increased understanding of the utility of satellite fire products and their use for global change research, resource management and policy (UN, Regional, National, Local)
- **Establish a geostationary global fire network**
  - providing operational high temporal resolution standard fire products of known accuracy
- **Secure *operational* polar orbiters (coarse and moderate) with adequate fire monitoring capability**
  - providing operational coarse and moderate resolution long-term global fire products to meet user requirements and serving a network of distributed ground stations
  - providing fire products (e.g. active fire/burned area/fire characterization/fuel moisture content) in a timely fashion
  - providing operational high resolution acquisition allowing active fire, burned area, fire characterization and post-fire assessments

Current GOFC/GOLD-Fire Goals (Cont'd)

- **Determine product accuracies**
  - operational network of fire validation sites and protocols established providing accuracy assessment for operational products and a test bed for new or enhanced products – leading to standard products of known accuracy
- **Develop a Fire Early Warning System providing operational global fire danger / susceptibility products**
  - combining meteorological data, remote sensing, and ground based information
- **Develop fire emissions product suites**
  - providing annual emission estimates of known accuracy with the associated input data

Current GOFC/GOLD-Fire Goals (Cont'd)

- **Develop Long-Term fire data records**
  - Combining data from multiple satellite sources
- **Establish enhanced user products and improved data access**
  - operational multi-source fire / GIS products, Web based data access, Improved national fire reporting, Fire characterization customized to user needs
- **Promote experimental fire observation systems and related research**
  - in new areas focused on meeting current information gaps

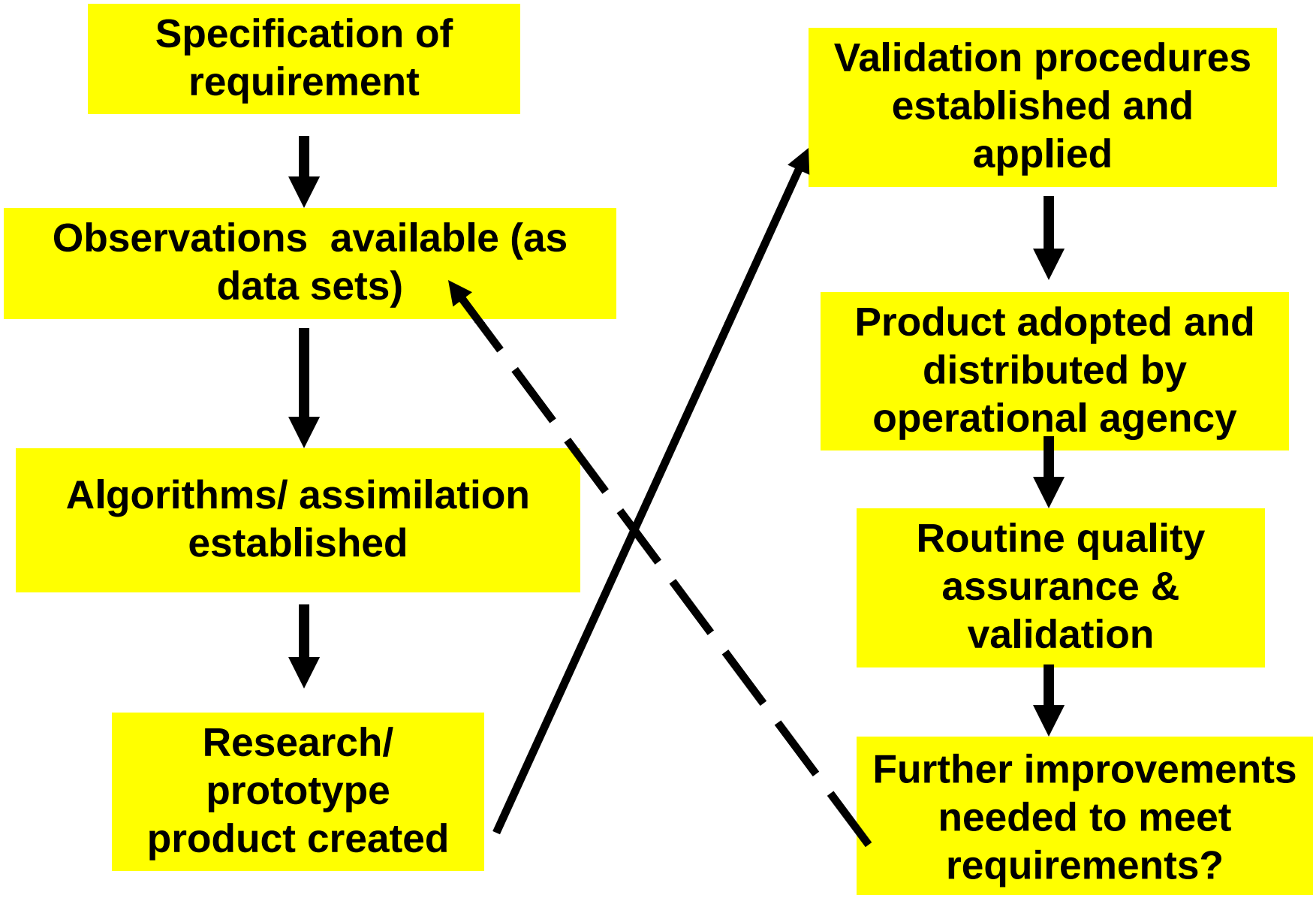
Current emphasis on Fire IT goals

- Spaceborne Assets
  - Geostationary Global Fire Network
  - Fire Monitoring with next generation Operational Polar Orbiters > Data Continuity
  - Moderate Resolution 'Constellation' > Data Continuity
  - Sensor Web Demonstration and Technology Development
  - Next Generation Fire Sensor Technologies
- Data and Information Products
  - Regional / Global Burned Area Products
  - Systematic global BA product validation (CEOS LPV Stage 3)
  - Near real-time and regional fire emissions modeling
  - Global Fire Danger Rating System
  - Multi-source fire information integration
  - Long Term Fire Data Records
  - Global Fire Assessment

Current Areas of Emphasis

- Data Distribution
  - Near Real-Time Global Daily Active Fire Monitoring
  - Web based Fire and Imagery Distribution Systems
  - GeoNetcast Distribution
  - Increased Coordination between Direct Readout Stations (ILDRCC)
- Capacity Building for Data Utilization
  - Fire Regional Networks – workshops and initiatives
  - Increased UN Fire Monitoring Capability

Template for GOFC/GOLD to operationalize its products



Progress Towards GOFC Program Goals

Fire Products									
GOFC/GOLD Products	**GOFC Spec.**	**Requirement**	**Observations**	**Algorithms**	**Prototype**	**Assessment**	**Operational**	**QA & Val**	**Iterate**
Active fire detection - daily (polar)	CNES WS App 4, p.35	Y	Y	Y	MODIS, AVHRR, DMSP, AATSR, VIRS	P	Y	P	N
Active fire detection - diurnal cycle (geostationery+polar)	FIRE IT web site	Y	Y	Y	GOES, VIRS	P	Y	N	N
Burnt area	CNES WS App 4, p.36	Y	Y	Y	Globscar, GBA MODIS	P	N	N	N
Emission product suite	FIRE IT web site	Y	P	P	N (available regionally)	N	N	N	N
Fire danger rating	FIRE IT web site	Y	P	P	N (available regionally)	N	N	N	N

(Green indicates substantive progress; tan equals partial progress; and yellow means no progress yet)

Progress since Ispra, 1998

- Improved and Broadened communication amongst the fire community/practitioners
  - Including active research collaborations e.g. FRP
- Expanding access to Data, increasing number of Fire Products (and freeing up of data)
  - ATSR Fire Atlas, TRMM Active Fire , MODIS Active Fire, Geostationary Fire
  - MODIS Burned Area, Spot VGT Burned Area
- Increased attention to data quality and systematic product validation (CEOS LPV)
- Increasing length of fire records
- Increasing number of fire data users and uses
- Increasing emphasis on and scope of Fire in the science literature Inc. fire/climate
- Increasing use of Fire Direct Broadcast data – shared code availability
  - Regional customized products
  - MSG/GOESS/MTSAT, MODIS, *NPP VIIRS , Sentinels ???*
- Some success in incorporating fire needs in the future and planned systems
- Growing Regional Networks and Capabilities
  - Recognition of GOFC and Fire Networks
  - Strengthening regional requirements for fire information
- Partnership with UN ISDR Fire – increasing UN recognition of Fire issues
  - International Fire Summits, Regional Consultations
  - Fire in UN REDD
  - Fire included in GCOS ECV's > UNFCCC
- Increased Media uptake of Fire Data and issues – not just disasters !
- Web-based Fire Data Info Systems – Australia, US, Mexico, Brazil, S. Africa, etc
- GEOSS – focus on societal benefit of observations – some success in including fire
  - Fire Early Warning System
  - Geostationary Network / Constellation

Current Priorities for GOFC/GOLD-Fire

- Meteorological Agency support for establishing the Global Geostationary Fire Network
- Ensure operational fire monitoring capabilities on NPOESS VIIRS and METOP, Sentinel 3 providing data continuity
  - Ensure Direct Readout access to the data
- International Space Agency coordination of global Landsat Class resolution data acquisition and availability
- Implementation of an operational Fire Early Warning System
- Development of an international collaborative program on Global Burned Area Product Validation (LPV Stage 3 Validation)
- Support for running the Regional Fire Networks and developing capacity building programs on the use of satellite fire data
- Providing a coordination mechanism for fire observations in support of the International Conventions (i.e. ECVs)
- Defining the role of Fire in UN REDD (i.e. GOFC-GOLD REDD Sourcebook)

Where are we trying to go?

1. Fire Monitoring

- The necessary Fire Observations to support science and applications – satellite and ground based
- Global geostationary network – standard algorithms (characterized differences) – <1km spatial - 15 minute repeat – NRT delivery – active fire and FRP
- Long term polar orbiting record AM/PM – global BA products – known accuracy – continuous record
- Coordinated international constellation of operational high resn sensors providing 3-5 day cloud free global coverage
- Periodic global mapping of vegetation structure - 10m?
- Targeted rapid tasking of 3m-1m sensors or UAV's providing disaster monitoring and post fire assessment
- Free and open satellite data access and sharing
- National ground based observation systems in place – open data sharing

(some preliminary thoughts from the former Fire IT Executive Officer)

Where are we trying to go?

2. Fire Management

- Global early warning system in place complementing national EWS
- Satellite fire data used for national fire monitoring as appropriate
- Regional sharing of fire management resources – emergency response
- Standardized national annual reporting w. known accuracy utilizing satellite assets where appropriate
- Science informed fire policies based on understanding of fire ecology and current resources at risk
- Operational NRT Fire Emissions Modeling in place
- Fire / Air Quality policies and monitoring systems in place
- Public access to NRT information on fire risk and locations
- Post fire assessment supported by satellite data leading to burned area recovery

Where are we trying to go?

3. Fire Science
   - Accurate estimation of regional/global fire annual emissions
   - Further understanding of fire role in Carbon and Biogeochemical Cycles
   - Fire, Smoke, Cloud interactions further understood
   - Fire ecology informing fire policy and management at the local level
   - Integrated modeling of future fire trends based on improved climate, socio economics and policy scenarios
   - Better understanding of fire, climate feedbacks
   - Etc

Some Current Obstacles and Opportunities

- Example Obstacles
  - Commitment to data and product continuity fragile
  - Commitment for product validation limited
  - Commitment for data archive mining challenging
  - Commitment to free and open data very mixed
  - Funding for regional network maintenance /projects unidentified
  - Institutional limitations
- Example Opportunities
  - VIIRS, Sentinels, GOESS Next, LDCM, Decadal Survey etc
  - India and China satellite series + other national systems
  - Climate and Global Change
  - UN ECVs – rationale for comprehensive validation
  - UN REDD and Carbon Management - new products and uses
  - GEOSS <> CEOS strengthening
  - Globalization of environmental issues

Format for the Workshop

- 2.5 days – please stay for the full day on Thursday (thurs pm planning)

- Designed to encourage free and open discussion and exchange of ideas - all are invited to participate (IT Members and 'Observers')
- Need to develop some form of consensus from the IT as to where as a community we need to go next (revised goals) and how to get there (strategic/tactical)
- Upcoming opportunities to attain these goals

- Short (15 min) overview presentations (one presenter) on selected topics followed by questions and discussion (45 mins)
- Sharing of more detailed information/presentations on the protected FTP Site

- Krishna will be taking notes of the discussion – will develop a meeting report – with a possible review article on community priorities for fire observations

Outline Agenda for the Meeting

- **Welcome and Introduction**
- **Topical Reviews** (15 min talk, 45 min questions and discussion)
  - Current Polar Orbiter Fire Products (Roy, Badarinath) — Tuesday PM
  - Global Geostationary Network (Csiszar, Wooster)
  - Fire Product Validation (Boschetti, Tansey)
  - Fire ECVs (Arino, *VanLierop ?*) — Wednesday AM
  - Fire Data Continuity (Vadrevu, Plummer)
  - Global Fire Early Warning (de Groot, San Miguel)
  - Fire Emissions (van der Werf, *Louisse*, Brivio) — Wednesday PM
  - UN REDD Fire (Boschetti, Hoffman) – Molliconi
  - Fire Observations from New Instruments (Lorenz,Giglio,)
  - GOFC Global Fire Assessment (Justice, Goldammer) — Thursday AM
- **Regional Network Summaries**
  - SAFNET
  - Redlatif
  - WARN
  - SEARIN
  - CARIN
  - ISDR Wildland Fire Networks

Outline Agenda Continued

- **Focused Discussion Sessions** (co-chairs to lead)
  - Program Strengths, Weaknesses, Directions and Opportunities (Roy, Brivio) – Wednesday
  - Regional Networks (Frost, Cruz) Thursday
  - Priorities for Observation Coordination (Chuvieco, *Frost Wooster ?*) Thursday
  - Updated GOFC-GOLD Fire Strategy (Lynham, Csiszar)
  - Next Steps and Actions (Justice, Goldammer)
  - Meeting Report and Recommendations (Vadrevu)