

# GOFC/GOLD

(Global Observations of Forest Cover/Global  
Observations of Land Cover Dynamics):

## A Status Report

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# Goals and Objectives

- Panel of the Global Terrestrial Observing System (FAO-based).
- Objectives
  - Improve access to remote sensing data.
  - Improve pre-processing of remotely sensed data.
  - Improve global and regional land cover products.
  - Ensure the delivery and exchange of *in situ* products.
  - Prototype coupled remote sensing - in situ systems
  - Evaluate and validate global land cover products.
  - Demonstrate land cover change monitoring

# Status

- Recognize the substantial support from NASA and in particular from NASA LCLUC and CFS.
- New Executive Director: Michael Brady, Canadian Forest Service
- Land Cover Implementation Team:
  - Co-Chairs: David Skole (MSU) and Chris Schmullius (Frederick Schiller University Jena, Germany)
  - New project office funded by ESA
- Fire Implementation Team
  - Co-chairs: Chris Justice (UMD) and Johan Goldammer, (Global Fire Monitoring Center (GFMC) Max Planck Institute for Chemistry).

# Focus is on operational capabilities

- Presents major challenges since there have been relatively few national or international operational organizations responsible for terrestrial observations (cf. oceans and atmosphere).
- Some encouraging signs
  - Meteorological agencies beginning to extend remit to the land (e.g. NOAA and Eumetsat).
  - Following 2<sup>nd</sup> Adequacy Report COP of FCCC is requesting an operational plan from GCOS and this includes terrestrial observations.
  - Proposals exist for an international coordination mechanism laying down standards for observations.
  - VIIRS on NPOESS will serve as an operational moderate resolution land imager.
  - Proposed new Integrated Global Observations Strategy Partnership Theme on the Land (Integrated Global Observations of the Land)

# **Integrated Global Observations of the Land (IGOL):**

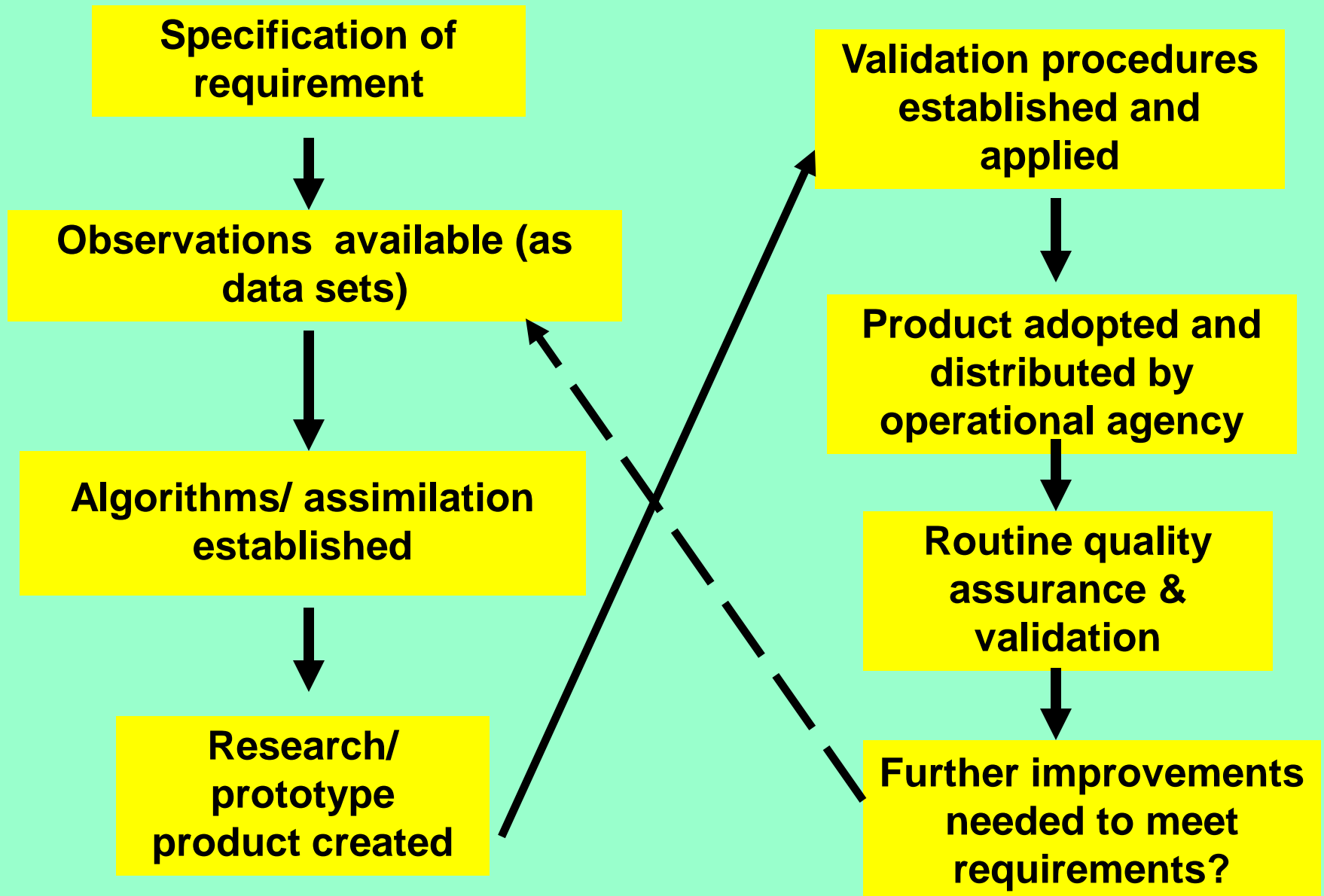
## **a pre-proposal.**

- **One of last major areas not yet covered by IGOS-P .**
- **Needed for**
  - sustainable economic development,
  - natural resources management,
  - conservation,
  - biodiversity
  - scientific understanding of ecosystems processes and services; biogeochemical cycling
  - climate change and its impacts
- **No duplication of other themes**
  - Carbon, water, coastal.
- **Main topics**
- **Land cover land use and drivers.**
- **Human settlement**
  - Urbanization, demographics, land tenure.
- **Managed ecosystems**
  - Agriculture, forestry.
- **Natural ecosystems**
  - Ecosystem functions and services, biodiversity, conservation.
- **Soils**
  - Sustainable development, soil loss.
- **Biogeochemical cycles**
  - In addition to carbon (N,P,K)

# The downside

- The fine resolution observing capability of ETM/Landsat is seriously compromised.
- Other sensors exist but no sensible acquisition strategy
- No plans yet for an operational ETM
- Instrument could be placed on NPOESS Lite
  - Polar Orbiting Land Observer (POLO)

# Template for GOFC/GOLD to operationalize its products



# Fine Resolution Cover Products

GOFC/GOLD Products	GOFC Spec.	Requirement	Observations	Algorithms	Prototype	Assessment	Operational	QA & Val	Iterate
Land Cover Classification	CNES WS App 3, p.11	Y	Y Landsat, HRV	Y	N (available regionally)	N	N	N	N
Land cover change (RAD)	CNES WS App 3, p.11	Y	Y, Landsat, HRV	Y	N (available regionally)	P	N	N	N
Land cover change (harvesting, insect and disease, regeneration)	CNES WS App 3, p.11	Y	P, Landsat, HRV	P	N (available regionally)	P	N	N	N
Forest Cover fragmentation	CNES WS App 3, p.16	Y	Y	N	N	N	N	N	N



<b>Coarse resolution land cover products</b>									
<b>GOFC/GOLD Products</b>	<b>GOFC Spec.</b>	<b>Requirement</b>	<b>Observations</b>	<b>Algorithms</b>	<b>Prototype</b>	<b>Assessment</b>	<b>Operational</b>	<b>QA &amp; Val</b>	<b>Iterate</b>
Land cover classification	CNES WS App 4, p.31	Y	MODIS/ Vegetation/ AVHRR	Y	MODIS standard product; GLC 2000	P	Y (VIIRS EDR)	N	N
Forest density (continuous fields)	CNES WS App 4, p.33	Y	MODIS/ Vegetation/ AVHRR	Y	MODIS product	P	N	N	N
Land cover change (indicator)	CNES WS App 4, p.34	Y	P (MODIS 250m)	Y	N (available regionally)	N	N	N	N

<b>Fire Products</b>									
<b>GOFC/GOLD Products</b>	<b>GOFC Spec.</b>	<b>Requirement</b>	<b>Observations</b>	<b>Algorithms</b>	<b>Prototype</b>	<b>Assessment</b>	<b>Operational</b>	<b>QA &amp; Val</b>	<b>Iterate</b>
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-2000, MODIS Regional	P	N	N	N
Emission product suite	FIRE IT web site	Y	P	?	N (available regionally)	N	N	N	N
Fire danger rating	FIRE IT web site	Y	?	?	N (available regionally)	N	N	N	N

## Biophysical Products

GOFC/GOLD Products	GOFC Spec.	Requirement	Observations	Algorithms	Prototype	Assessment	Operational	QA & Val	Iterate
LAI	CNES WS App 4, p.35	Y	Y	Y	MODIS	P	?VIIRS	N	N
FPAR	CNES WS App 4, p.38	Y	Y	Y	AVHRR, MODIS	P	?VIIRS	N	N
PAR	CNES WS App 4, p.39	Y	Y	Y	GOES	P	?VIIRS	N	N
NPP	CNES WS App 4, p.40	Y	Y	Y	AVHRR, MODIS	P	N	N	N
Biomass	CNES WS App 4, p.41	Y	N	P	N	N	N	N	NA

# Progress in meeting our goals

Cover Products								
Fine resolution land cover classification	CNES WS App 3, p.11	Y	Y Landsat, HRV	Y	N (available regionally)	N	N	N
Fine resolution land cover change (RAD)	CNES WS App 3, p.11	Y	Y, Landsat, HRV	Y	N (available regionally)	P	N	N
Fine resolution land cover change (harvesting, insect and disease, regeneration)	CNES WS App 3, p.11	Y	P, Landsat, HRV	P	N (available regionally)	P	N	N
Forest Cover fragmentation product	CNES WS App 3, p.16	Y	Y	N	N	N	N	N
Coarse resolution land cover classification	CNES WS App 4, p.31	Y	MODIS/ Vegetation/ AVHRR	Y	MODIS standard product; GLC 2000	P	Y (VIIRS EDR)	N
Coarse resolution forest density (continuous fields)	CNES WS App 4, p.33	Y	MODIS/ Vegetation/ AVHRR	Y	MODIS product	P	N	N
Coarse resolution land cover change (indicator)	CNES WS App 4, p.34	Y	P (MODIS 250m)	Y	N (available regionally)	N	N	N
Fire Products								
Active fire detection - daily (polar)	CNES WS App 4, p.35	Y	Y	Y	MODIS, AVHRR, DMSP, AATSR, VIIRS	P	Y	P
Active fire detection - diurnal cycle (geostationery+polar)	FIRE IT web site	Y	Y	Y	GOES, VIIRS	P	Y	N
Burnt area	CNES WS App 4, p.36	Y	Y	Y	Globscar, GBA-2000, MODIS Regional	P	N	N
Emission product suite	FIRE IT web site	Y	P	?	N (available regionally)	N	N	N
Fire danger rating	FIRE IT web site	Y	?	?	N (available regionally)	N	N	N
Biophysical Products								
LAI	CNES WS App 4, p.35	Y	Y	Y	MODIS	P	?VIIRS	N
FPAR	CNES WS App 4, p.38	Y	Y	Y	AVHRR, MODIS	P	?VIIRS	N
PAR	CNES WS App 4, p.39	Y	Y	Y	GOES	P	?VIIRS	N
NPP	CNES WS App 4, p.40	Y	Y	Y	AVHRR, MODIS	P	N	N
Biomass	CNES WS App 4, p.41	Y	N	P	N	N	N	N

\* for the sake of brevity I have indicated the sensor from which pro

# Global Geostationary Fire Monitoring Applications

- **A Joint GOFC/GOLD Fire and CEOS LVP Workshop, March 23-25, 2004, EUMETSAT, Darmstadt, Germany**
- Goal is near real-time operational global geostationary fire monitoring network using GOES, MSG and MTSAT data to monitor fires as they occur and capture the diurnal signature.
- Review current and future geostationary satellite sensors (GOES, MSG, MTSAT) and capabilities for active fire detection and pre- and post-fire monitoring applications (e.g. fire risk, surface albedo monitoring, and burned area mapping with MSG HRV);
- Identify global/regional user product requirements, specifications, and applications;
- Review algorithm development activities, product generation, and availability;
- Evaluate the feasibility of a coordinated near real-time global geostationary fire monitoring applications system;
- Develop timeline and list of participants involved in the implementation of a global geostationary monitoring system;
- identify validation activities;
- Discuss ways to generate integrated polar and geostationary products for enhanced global monitoring.

# GOFC/GOLD LAND COVER

## IMPLEMENTATION TEAM MEETING

- **March 2-4, 2004, Friedrich Schiller University Jena, Germany**
- In February 2002, the Land Cover Implementation Team inaugurated its first 2-year plan.
- Meeting is to review the accomplishments and to continue towards an operational forest and land cover monitoring system (using both satellite and in situ observations), ESA's new GOFC/GOLD-Land Cover Office is hosting the 2<sup>nd</sup> Implementation Team meeting at the Friedrich Schiller University in Jena, Germany,
- Science Drivers, Land Change Science, Carbon and Biodiversity
- Programme Requirements and Global Initiatives
- Special Topics -
  - Classification Strategies,
  - Land Cover Products,
  - Data and Information Systems,
  - Validation Schemes
- GOFC/GOLD Applications – Regional Networks
- GOFC/GOLD Applications – Synthesis of Status-Quo, Draft for
- Implement Plan Phase Two

# Importance of regional activities

- Reallocating our modest resources to support regional activities.
- Major Central African activity supported using AID funds.
- NEESPI activity will prove a major catalyst in Russia to support the goals of GOFC/GOLD.

# *Northern Eurasia Regional GOF-C-GOLD*

## *Workshop* February 23-26, 2004, St. Petersburg, Russia

- This regional GOF-C/GOLD Workshop is designed to promote the development of research infrastructure in support of NEESPI
- NEESPI seeks to establish a large-scale, international, interdisciplinary program aimed at developing a better understanding of interactions between ecosystem, atmosphere, and human dynamics in Northern Eurasia.
- A major factor in the success of NEESPI is the development of the network of scientists and institutions capable of meeting the needs of NEESPI research agenda.
- The workshop will initiate the formation of Northern Eurasia Regional Information Network (NERIN) with observational data inventory as a major activity initially.
- The workshop will focus primarily on remotely sensed and *in-situ* data collected and archived by existing operational and scientific observational networks. NERIN will provide a framework for linking these networks and use them as a basis for development of a new network oriented towards support of NEESPI research agenda.



# Importance of Validation

- Support of CEOS Cal Val Working Group- Land Products Validation
- Workshop on validation of classification products hosted at BU at the beginning of February
- Workshop on validation of continuous fields proposed to be held at UMD late 2004.



# Deciding what needs to be coordinated internationally

- International organizations are usually most effective at
  - providing overall strategies and overarching frameworks
  - setting well articulated goals
  - providing a context for garnering resources
  - sharing experiences and hence raising capabilities
  - establishing and gaining consensus on standards and protocols
  - improving data access and distribution
  - assessing whether goals are being met
  - fostering capacity building
- International organizations are usually less effective at:
  - Raising resources to actually carry out research or to generate products
  - Carrying out the activities themselves unless there is a very major investment in something like the ECMWF