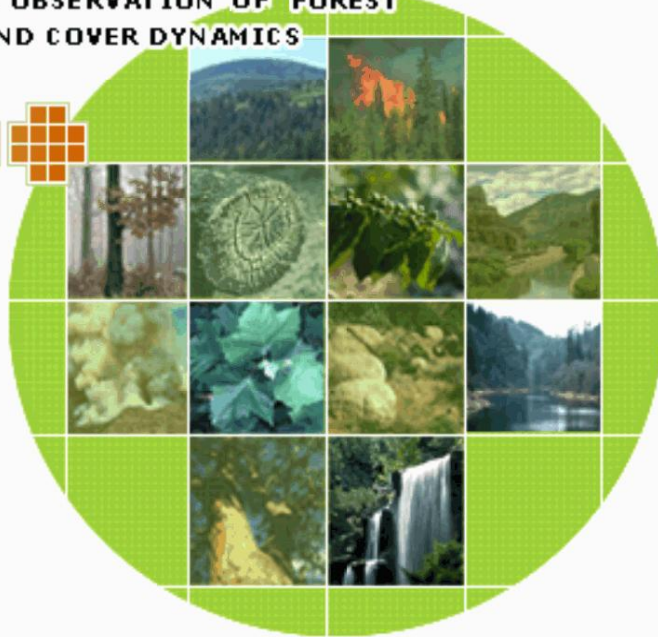


GOFC-GOLD

GLOBAL OBSERVATION OF FOREST
AND LAND COVER DYNAMICS



January 2005

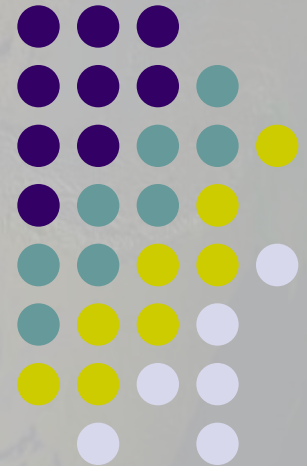


GOFC-GOLD

GTOS

esa

John Townshend,
Martin Herold
Chris Schmullius
Chris Justice
Ivan Csiszar
David Skole
Michael Brady



Friedrich-Schiller-Universität Jena

Guiding motivations



World summit on sustainable development (WSSD):

Promote development and wider use of earth observation technologies, incl. satellite remote sensing to collect quality data

Group of Earth Observations (GEO):

Global Earth Observation System of Systems (GEOSS) which should be comprehensive, coordinated, and sustained

COP9 and IPCC:

The data requirements ... may be met through approaches that are based on monitoring land-cover change, such as remote sensing



GOFC-GOLD Missions

- Multifaceted **international strategy** to bring the Earth's land cover under **continuous operational observation**
- Vision to **share data**, information and knowledge, leading to informed action and decision support
- **Network** of participants implementing coordinated research for global monitoring of terrestrial resources, global assessments and the study of global change
- Establishing international **standards and protocols** especially with respect to issues like validation



Principal Sponsors

- NASA
- ESA
- Canadian Space Agency
- Canadian Forest Service
- European Commission

GEO(SS), UNFCCC, COP-9, MEA ...

REQUIREMENTS

IGOS Partnership

International
Sponsors of GTOS:
FAO, UNEP, ICSU, UNESCO,
WMO

GCOS
GOOS

Global Terrestrial
Observing System
(GTOS)

Associates
of CEOS

Committee
on Earth
Observation
Satellites
(CEOS)
incl.
Cal-Val

Technical
panel

Collaborative
Projects

GOFC-GOLD

Data
"producer"

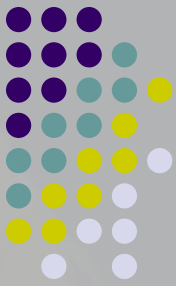
Science

Data
"users"

IMPLEMENTATION

**S
T
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G
Y**

GOFC-GOLD operational structure



Implementation Teams

Regional Networks

Land Cover

Characteristics and changes
Co chairs:
D. Skole / C. Schmullius

Biophysical processes

Co chairs: TBD

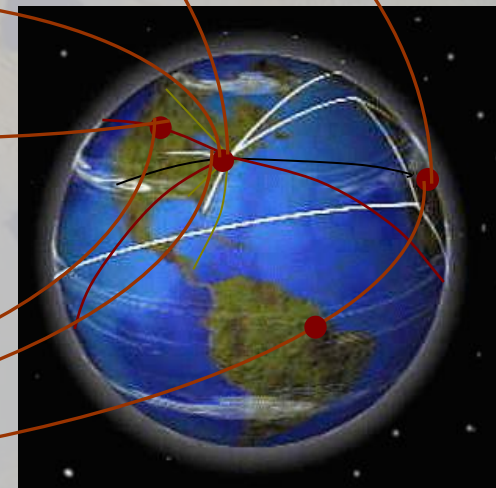
Fire

Mapping and monitoring
Co chairs:
C. Justice / J. Goldammer

GOFC-GOLD implementation teams plan, conduct and supervise the activities.

Role of Regional Networks:

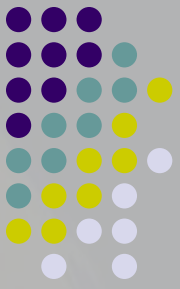
- Interface to national and regional user
- Refine user requirements
- Develop regional harmonized products
- Assist in validation of products
- Contribute in design and evaluation of data delivery systems
- Identify GOFC contributory projects
- Assist with GOFC projects implementation



Implementation priorities of Land Cover – Project Office



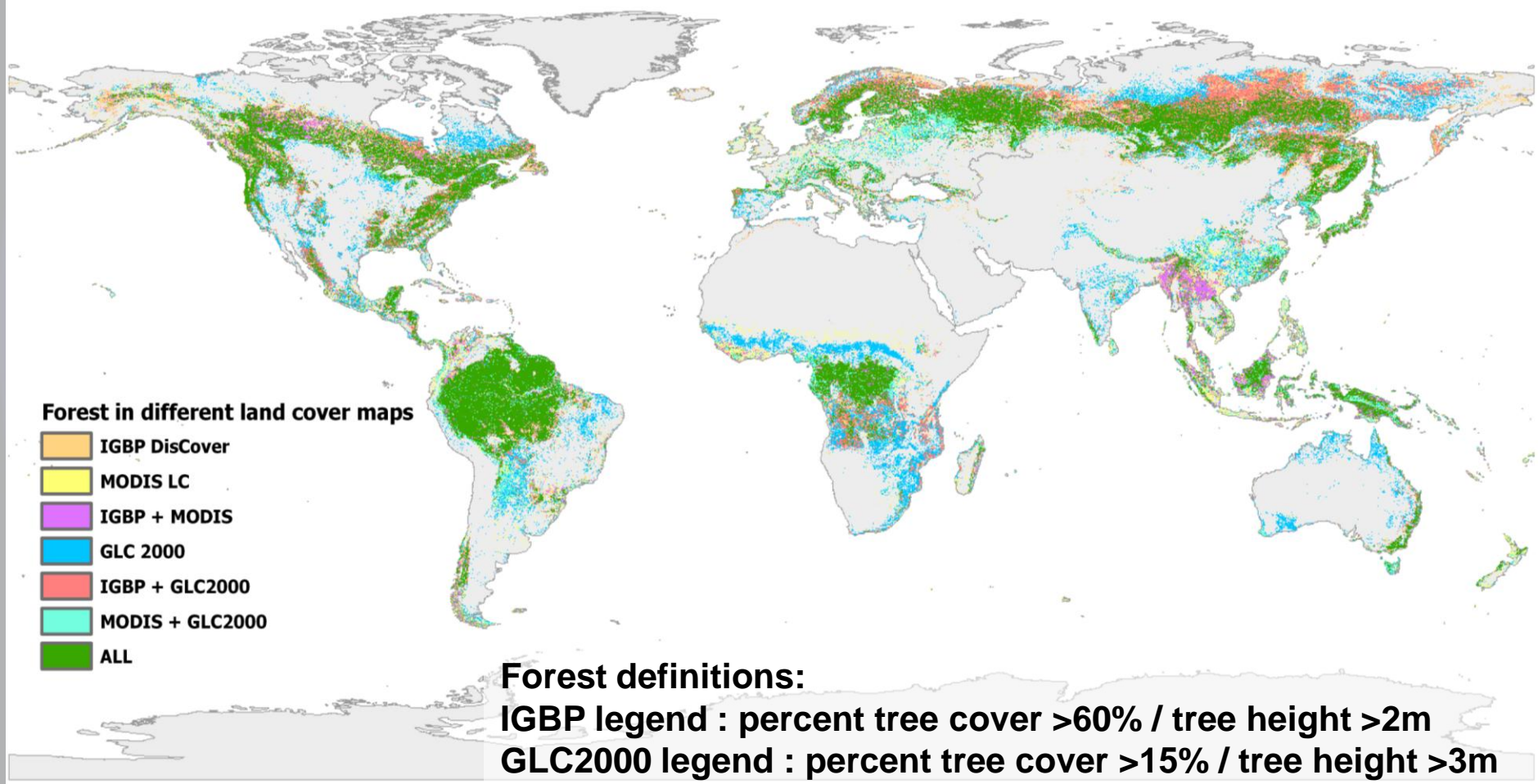
- **Funded by European Space Agency**
 - **Harmonization** of global and regional land cover products
 - **Validation** of global earth observation products
 - **Adequacy** and **advocacy** of earth observation in serving international conventions
 - Towards **operational** global observations of land
 - **Support** of new IGOL-theme and GLCN initiative
 - **Strengthen** international cooperations (e.g. regional networks)
- >>>> International, consensus oriented initiatives



Global land cover mapping

- National/international initiatives reflect different interests, requirements and methodology
- Harmonization/validation mentioned in many projects and initiatives
- Current maps exist as independent datasets
- Application is hindered (multiple uses, change)
- Goal: compatibility/comparability, solid estimation of accuracy, and observation continuity
- International consensus-oriented initiative

Forest areas in global land cover maps



Framing harmonization

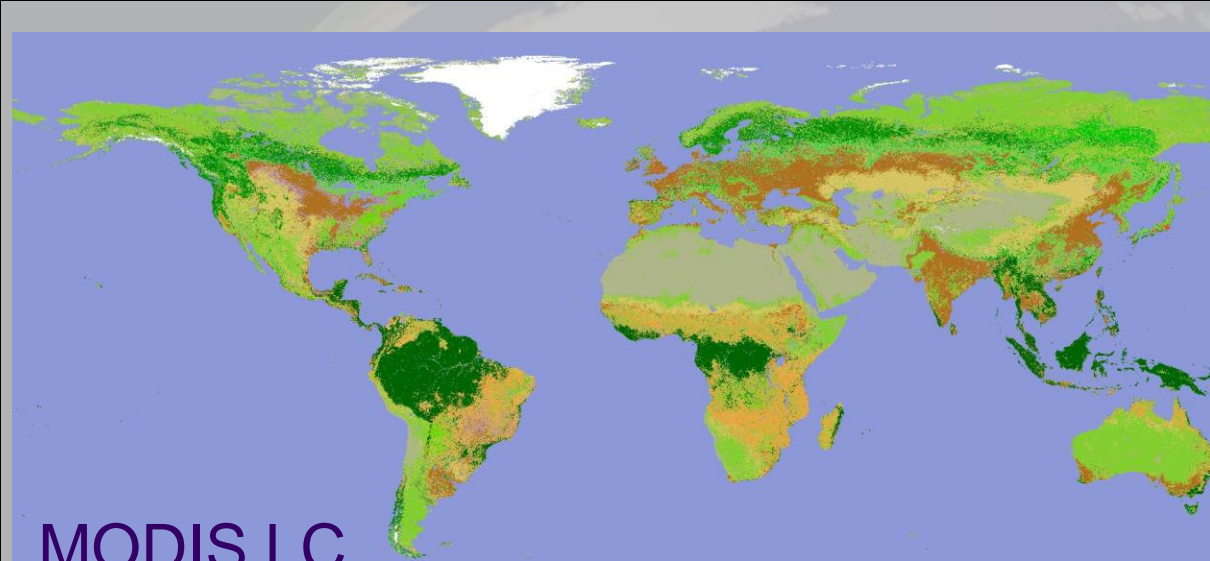


- Union of similarities in existing definitions
- “Bottom up process” - from an existing divergence to a state of comparability/compatibility
- Originally strong push for single lc/lu legend
- Too much standardization reduces application relevance
- Standardizing terminology rather than categories
- W/S: FAO/UNEP 1994, GOFC-GOLD 2004 (Jena/Rome)
- Problems in harmonizing land cover semantics:
 - Unclear thematic definitions (e.g. spectral classes)
 - Confusion between classification system and legend (e.g. mixed units)
 - Mix of land use/cover terms
 - Internal unbalance/inconsistency in legends

Harmonization mechanisms



- **Harmonization resources:**
 - Capacity building and web-based resources (LCCS)
 - Raise awareness and foster use of harmonized products
- **Harmonization experiences for existing datasets:**
 - Develop legend translation protocols/case studies
 - Translated legends: IGBP/CORINE/GLC2000/Anderson/IPCC ...
 - Compatibility/Comparability of datasets
- **Harmonization in future mapping products:**
 - Impact on future projects and operational programs
 - Standardized legend generation (e.g. MERIS products)
 - Consider inconsistencies in previous maps
- **Harmonization and validation are parallel efforts**



MODIS LC

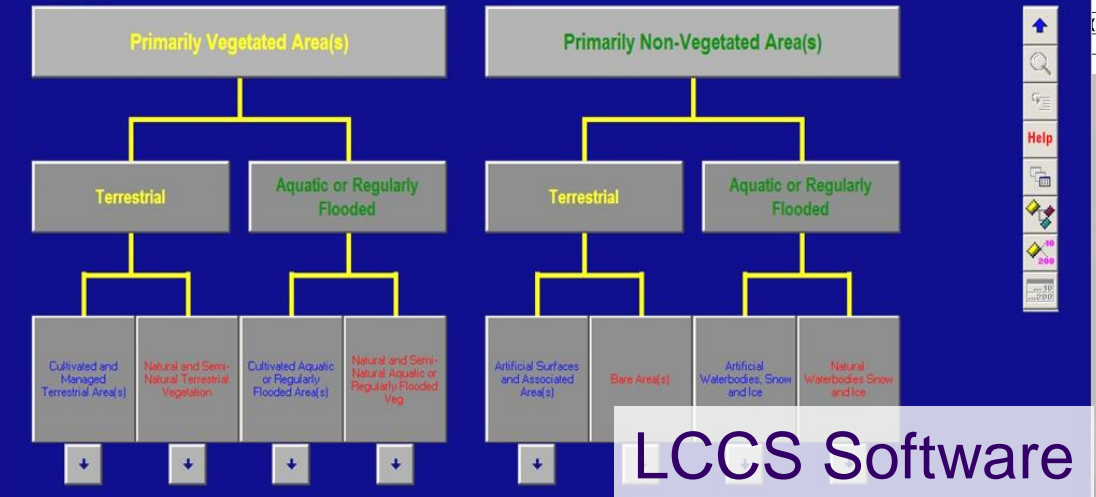
Intergovernmental Panel on Climate Change
 Good Practice Guidance
 for
 Land Use, Land-Use Change and Forestry
 Subject to Final Copyedit

IGES	IGES	IGES	IGES
1. The Class: Broadleaved evergreen forest Description: Broadleaved evergreen forest with a canopy cover of 60% or more.	2. The Class: Broadleaved deciduous forest Description: Broadleaved deciduous forest with a canopy cover of 60% or more.	3. The Class: Deciduous needleleaf forest Description: Deciduous needleleaf forest with a canopy cover of 60% or more.	4. The Class: Evergreen needleleaf forest Description: Evergreen needleleaf forest with a canopy cover of 60% or more.
5. The Class: Mixed forest Description: Forest with a mix of broadleaved and needleleaf trees.	6. The Class: Closed shrublands Description: Closed shrublands with a canopy cover of 10% to 60%.	7. The Class: Open shrublands Description: Open shrublands with a canopy cover of 10% to 60%.	8. The Class: Woody savannas Description: Woody savannas with a canopy cover of 10% to 60%.
9. The Class: Savannas Description: Savannas with a canopy cover of 10% to 60%.	10. The Class: Grasslands Description: Grasslands with a canopy cover of 10% to 60%.	11. The Class: Permanent wetlands Description: Permanent wetlands with a canopy cover of 10% to 60%.	12. The Class: Croplands Description: Croplands with a canopy cover of 10% to 60%.
13. The Class: Urban and built up lands Description: Urban and built up lands with a canopy cover of 10% to 60%.	14. The Class: Cropland/natural vegetation mosaics Description: Cropland/natural vegetation mosaics with a canopy cover of 10% to 60%.		



Color	IGBP class	LCCCode	LCCLLevel	LCCLLabel
Dark Green	Evergreen needleleaf forests	20092	A3A10B2XXD2E1	Needleleaved Evergreen Trees
Light Green	Evergreen broadleaf forests	20089	A3A10B2XXD1E1	Broadleaved Evergreen Trees
Medium Green	Deciduous needleleaf forests	20093	A3A10B2XXD2E2	Needleleaved Deciduous Trees
Light Green	Deciduous broadleaf forests	20090	A3A10B2XXD1E2	Broadleaved Deciduous Trees
Light Green	Mixed forests	20006(1)[Z1]	A3A10B2Z1	Closed Trees
Light Green	Closed shrublands	20018-13476	A4A10B3-B9	Closed Medium High Shrubland (Thicket)
Light Green	Open shrublands	20022-13476	A4A11B3-B9	Open Medium High Shrubs (Shrubland)
Light Green	Woody savannas	20317-1	A3A11B2XXXXXF2F4F7G4-A12	((70-60) - 40%) Woodland with Herbaceous Layer
Light Green	Savannas	20014-3012	A3A11B2-A13	Open (40 - (20-10)%) Trees (Woodland)
Light Green	Grasslands	21453	A2A20	Herbaceous Closed to Open Vegetation
Light Green	Permanent wetlands	0007	A24	Natural And Semi-Natural Aquatic or Regularly Flooded Vegetation
Light Green	Croplands	10025	A3	Herbaceous Crop(s)
Light Green	Urban and built up lands	5001	A1	Built Up Area(s)
Light Green	Cropland/natural vegetation mosaics	10025 / 0004	A3 / A12	Herbaceous Crop(s) / Natural And Semi-Natural Primarily Terrestrial Vegetation

Translations:
 Legend/Legend
 Legend/Application

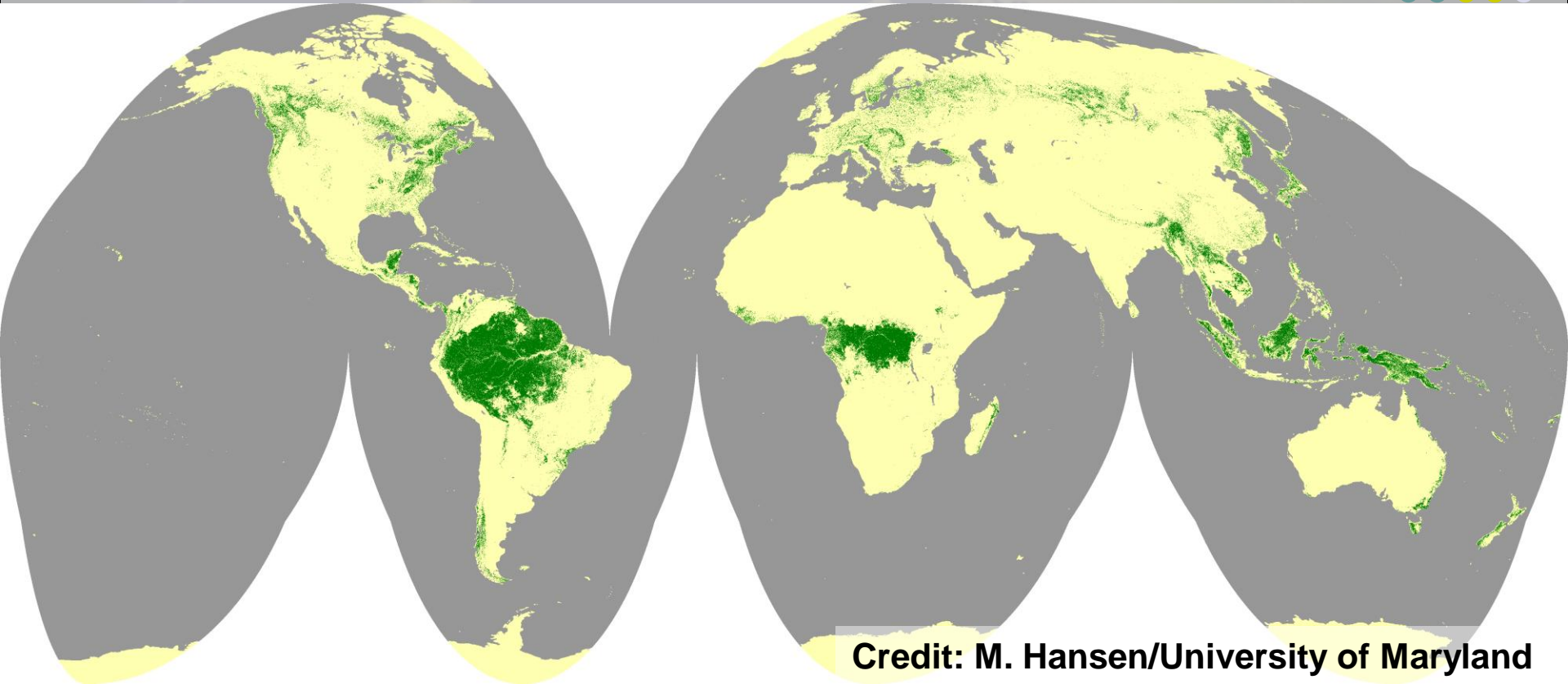
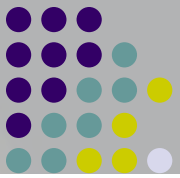


LCCS Software



Workshop discussions

VCF can support harmonization of land cover data



Credit: M. Hansen/University of Maryland

0% tree cover threshold 100%



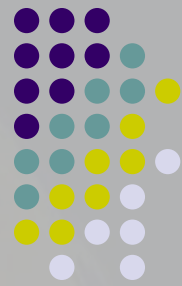
Validation of land cover datasets



- CEOS Cal-Val Land Product Validation Subgroup
- Validation activities (match GOFC-GOLD efforts):
 - Land cover/land cover change (GLC2000)
 - Biophysical parameters – VCF (starting with LAI)
 - Fire and burn scar
- Reference/validation sites
 - CEOS land validation core sites (MODIS)
 - Other reference datasets exist (TEMS etc.)
 - Harmonization/integration (reference data “clearinghouse”)
 - LCCS to translate the individual in situ interpretations
- “Best Practices” doc by CEOS Land Validation Group
- Frustration with limited resources for validation
- Joint GOFC-GOLD CEOS Cal-Val initiative



Framework for joint GOFC-GOLD/CEOS Harmonization/Validation initiative

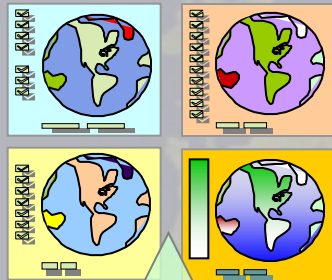


Existing global Primary LC products validation

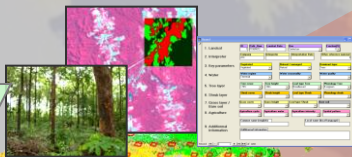
Comparative validation

Updated valid./change

Validation of new products

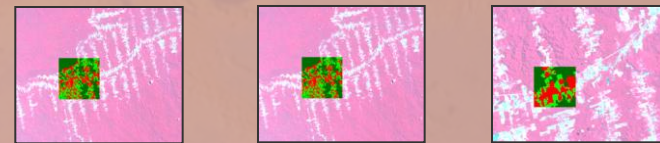


Legend translations



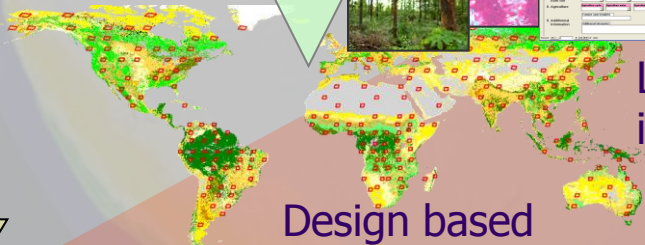
LCCS-based interpretation

Updated interpretations



Reference database: statistically robust, consistent, harmonized, updated, and accessible

Design based sample of reference sites



global

In-situ

Degree of comparability and harmonization

Time

Best use of expertise and resources



Harmonization

- Strategy and resources (LCCS)
- Legend translations and database
- Interoperability

(FAO/GLCN, GOFC-GOLD)

Data user community

- Land cover requirements
- Improved land cover data interoperability and usability
- Reflection on accuracy reporting

(FAO, UNEP, intern. Conventions etc.)

Validation techniques

- Sample design
- Response design
- Accuracy analysis

(CEOS Cal-Val, JRC)

Future mapping

- Standardized mapping and validation
- Local-regional-global integration
- Synergies and land cover change

(Space agencies, Mapping initiatives: MODIS, USGS, JRC, LAND etc.)

Core Coordination

(GOFC-GOLD, CEOS Cal-Val)

Interpretation resources

- Satellite data interpretation software
- Capacity building and training
- Response design

(FAO/GTOS, GOFC-GOLD, CEOS Cal-Val)

Reference database

- Host/data access web-interface
- Extension/maintenance of database

(FAO/GTOS-TEMS, GOFC-GOLD, CFS)

Interpretation satellite data

- Provide satellite data
- Data preprocessing and access
- Continuity in observations

(Space agencies, Land cover facilities)

Local/in-situ interpretations

- Reference data acquisitions
- Capacity building and training
- Link to regional activities

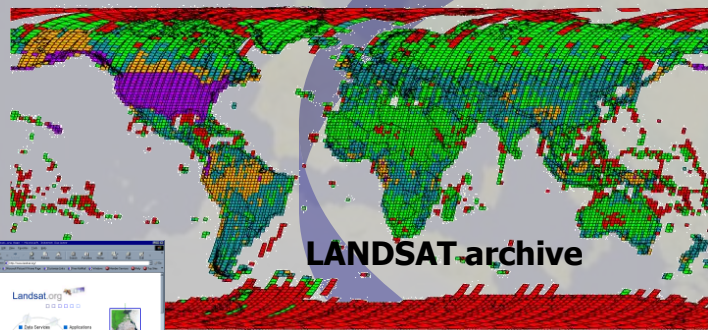
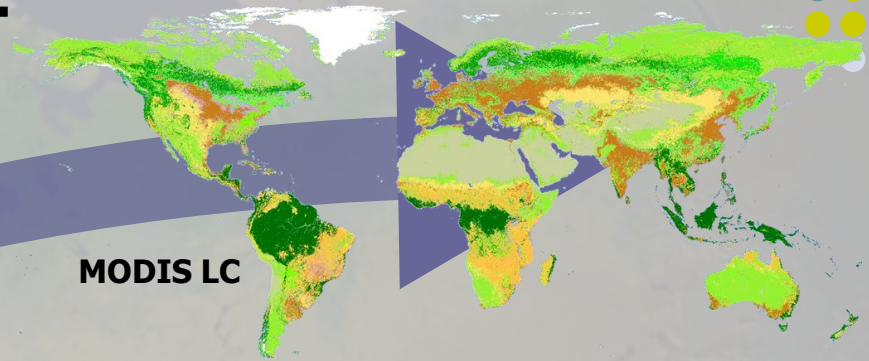
(GOFC-GOLD regional networks, GLCN, CFS)

Continuity and Consistency



Coarse resolution (250m-1km):

MODIS product suite
Continuous fields products
MERIS (GLOBCOVER ..)
Global LIDAR

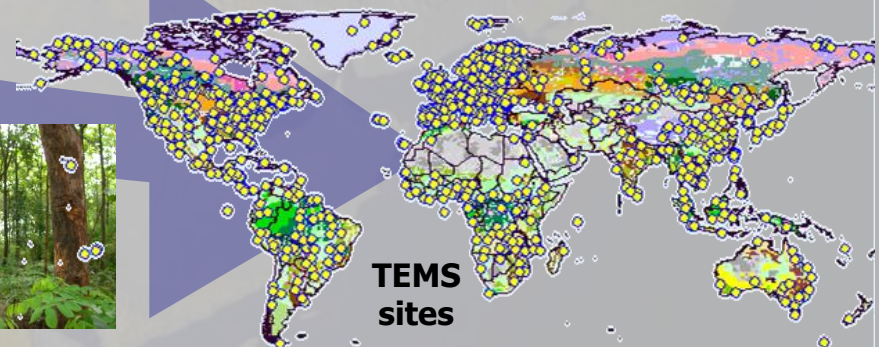


Fine resolution (20-50 m):

LANDSAT global mosaic 1990/2000
GLCF/landsat.org
New polar orbiting land observer
ERS/ENVISAT-ASAR/JERS/ALOS

In situ:

GTOS – TEMS
EOS VALIDATION CORE SITES
CEOS Cal/Val new valid. database





Continuity and Consistency

- **Operational observations of land:**
 - Integration of satellite and in situ observations:
 - From global to local
 - End-to-end international coordination:
 - From observation to use
- **Key issues for GOFC-GOLD/GTOS:**
 - Continued observation
 - Harmonization and validation
 - Data access and integration
 - Adequacy of data products
 - Understanding of spatio-temporal processes
- **Integrated Global Observations of Land (IGOL)**



GOFC/GOLD-Fire Goals

- **Increase user awareness**
 - 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 with adequate fire monitoring capability**
 - providing operational moderate resolution long-term global fire products to meet user requirements and serving a network of distributed ground stations
 - providing improved fire products (fuel moisture content/active fire/burned area/fire characterization) in a timely fashion
 - Providing operational high resolution acquisition allowing active fire, burned area, fire characterization and post-fire assessments

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 set of standard fire danger / susceptibility models**
 - 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
- **Establish enhanced user products and data access**
 - Operational multi-source fire / GIS products, Web based data access, Improved national fire reporting, Fire characterization
- **Promote experimental fire observation systems and related research**
 - in new areas focused on meeting current information gaps

GOFC/GOLD Regional Fire Networks



- The GOFC 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.
- Complement the emerging UN Regional Fire Networks which are focusing on fire management, policy and training
- Forum for data producers and users to interact to assess current data availability and existing data collection systems and proven research
- Forum for global change and resource managers to improve communication
- Mechanism for involving regional scientists and users in new product accuracy assessment (validation)
- Mechanism for lateral transfer of technology and applications experience

GOFC/GOLD Regional Networks



- **Current GOFC fire network initiatives** (<http://gofc-fire.umd.edu/>)
 - SEARRIN - South East Asia (<http://www.eoc.ukm.my/searrin/>)
 - OSFAC - Central Africa (<http://osfac.umd.edu/>)
 - SAFNET- Southern Africa (<http://safnet.umd.edu/>)
 - REDLATIF - Latin American (<http://mob.conae.gov.ar/redlatif/>)
 - NERIN – Northern Eurasia (<http://www.fao.org/gtos/gofc-gold/net-NERIN.html>)

- **Emerging Fire Network Initiatives on Observations**
 - Australasia
 - Mediterranean
 - East Asia - (under discussion)



Recent GOFC/GOLD-Fire Workshops and Meetings

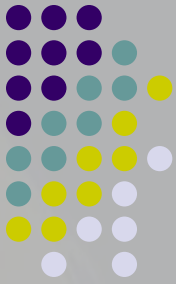
- GOFC/GOLD LBA Fire Validation Workshop, Belo Horizonte, Brazil (April 03)
- GOFC/EARSeL SIG Forest Fires - Joint Workshop on Innovative Concepts and Methods on Fire Danger Estimation, Ghent, Belgium (June 03)
- Far East Fire Network Workshop w. World Bank, USFS – Khabarovsk, Russia (Sept 03)
- GOFC/GOLD Fire Presentation, Sydney, Australia, (Oct 03)
- GOFC/NERIN NEESPI Planning Meeting, St Petersburg (Feb 04)
- SEARIN Burned Area Validation Workshop, Malaysia (May 04)
- GOFC/GOLD Geostationary Network Planning Meeting, Darmstadt, Germany (March 04)
- GOFC/GOLD regional fire validation workshop, Brasilia, Brazil (July 04)
- SAFNET Workshop – Malawi (Aug 04)
- GOFC/GOLD ACRSP Joint Workshop – Fremantle, Australia (Oct 04)
- GOFC/GOLD regional fire data systems workshop, Moscow, Russia (Nov 04)
- REDLATIF Regional Coordination meeting, Santiago Chile (Nov 04)



Next Steps for GOFC/GOLD Fire

- GOFC/GOLD-Fire Implementation Team meeting (Montreal Feb 2005)
 - Review goals and program progress
 - Strengthen Canadian participation
- GOFC/GOLD Science and Technical Board meeting (Beijing, March 2005)
 - Review of GOFC Fire Program
 - East Asia Regional Network
- EARSEL SIG-Fire /GOFC/GOLD Fire Workshop on Fire Effects Assessment (Zaragoza, June 2005)
- Strengthen Linkage between GOFC regional fire networks and the UN Regional Fire Networks
 - Coordinating observation component and training
- Improve integration of in-situ and satellite observations for fire monitoring and management

Outreach – Fire Web Site



The screenshot shows the GOFC/GOLD-FIRE website in English. The header includes the logo and the text "GOFC/GOLD-FIRE GOFC/GOLD Fire Monitoring and Mapping Implementation Team". A left sidebar lists navigation links such as Home, News, Background, Objectives, Participants, Implementation, Projects, Meetings, Resources, Site Map, and Search. The main content area is titled "What is GOFC/GOLD-Fire?" and contains several paragraphs of text describing the project's goals and its partnership with the Global Fire Monitoring Center (GFMC) and the United Nations International Strategy for Disaster Reduction (UNISDR) Working Group 4 on Wildland Fire. At the bottom, there are logos for the GFMC and UNISDR, along with contact information for the website's maintenance.

REDLaTIF – South America

The screenshot shows the REDLaTIF website in Spanish. The header features the title "Red Latinoamericana de Teledetección e Incendios Forestales (RedLaTIF) - Programa GOFC-GOLD-Fire" and a logo. A left sidebar lists navigation links including Inicio, Introducción, Objetivos, Contactos, Secretaría de GOFC/GOLD-Fire, Coordinadores de la Red, Miembros de la Red, Actividades de la Red, Acciones, Novedades, Noticias, and Contacto. The main content area is titled "Introducción" and describes the network's purpose in Spanish. It includes a section for "Objetivos de la Red" and "Objetivos específicos" which lists goals such as elaborating a list of active personnel, stimulating participation in events, and promoting international publications. The page is dated "12 Marzo 2005".

Key sections also in Spanish and Russian

GTOS/CEOS/GOFC-GOLD resources



- **GTOS:**
 - <http://www.fao.org/gtos/>
- **CEOS Cal-Val Land group**
 - <http://landval.gsfc.nasa.gov/LPVS/>
- **GOFC-GOLD:**
 - <http://www.fao.org/gtos/gofc-gold/>
- **GOFC-GOLD land cover project office:**
 - <http://www.gofc-gold.uni-jena.de/>
- **Land cover IT newsletter:**
 - <http://www.gofc-gold.uni-jena.de/sites/letter.html>

LC IT Membership



Co-leaders

- Chris Schmallius *Friedrich-Schiller-University*
- David Skole
Michigan State University

Members

- Ruth DeFries *University of Maryland*
- Olga Gershenzon *ScanEx*
- Hervé Jeanjean *Centre National d'Etudes Spatiales*
- Thelma Krug *Instituto Nacional de Pesquisas Espaciais - INPE*

- Eric Lambin
Universite Catholique de Louvain
- Tom Loveland *USGS EROS Data Centre*
- Philippe Mayaux *European commission Joint Research Centre*
- Ake Rosenqvist *National Space Development Agency of Japan*
- Gilbert Saint *Centre National d'Etudes Spatiales*
- Curtis Woodcock *Boston University*

GOFC/GOLD – Fire:

Implementation Team Members



- **Olivier Arino, ESA/ESRIN, Italy (ATSR, Envisat, GLOBCARB)**
- **Emilio Chuvieco, U. Alcala, Spain (Fire Danger/Med - S.Am Network)**
- **Chris Elvidge, NOAA/NGDC, USA (DMSP, SEAsia Network)**
- **Evgeny Loupian, SRI, Russia (DIS, NERIN Network)**
- **Johann Goldammer, (Co-Chairman), GFMC, Germany (UN ISDR)**
- **Jean-Marie Grégoire, JRC, Italy (Global Burned Area, W. Afr Netw)**
- **Donna McNamara, NOAA/NESDIS, USA (Operational monitoring)**
- **Chris Justice (Co-Chairman), UMd, USA (MODIS, NPP VIIRS, SAFNET/OSFAC)**
- **Tim Lynham, NRCan /CFS – Fire-M3 Detection and Fire Danger Rating**
- **Mastura Mahmud, UKM, Malaysia (SEA Network)**
- **Dieter Oertel, DLR, Germany (BIRD, Validation, Fire Characterization)**
- **Joao Pereira, IBAMA, Brazil (Pan Amazon ,Network, Multi-source Data/Validation)**
- **Elaine Prins, NOAA/NESDIS/ASPT, USA (GOES, Geostationary Network)**
- **Anatoly Sukhinin, RAS, Russia (AVHRR, NERIN Fire Monitoring)**
- **Ivan Csiszar (UMd, USA) - Fire IT Executive Officer (NPP VIIRS, ASTER)**

- **Regional Fire Network Leads**
 - Pauline Dube (SAFNET), Mastura Mahmud (SEARIN), Evgeny Loupian (NERIN), JF Bizenga (OSFAC)

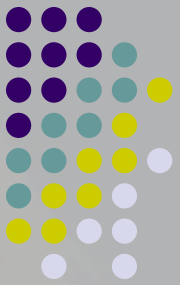
IGOS partnership



A coalition of international organizations working to define, develop and implement a global earth observing strategy on a basis of “best effort” and shared interest.



IGOS –P brings together

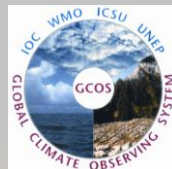


UN organizations

Space agencies

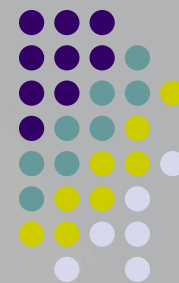


Global observing systems



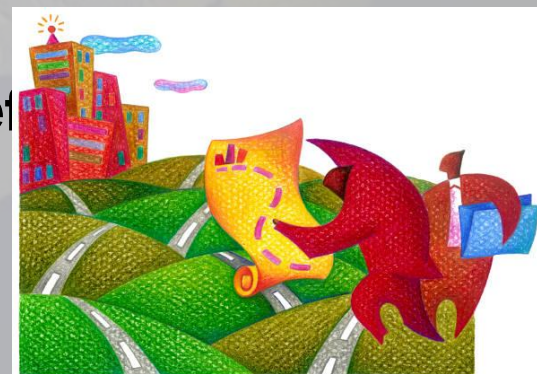
International science and research programmes





IGOS strategy (1)

- Bring together the major surface and satellite-based systems for global environmental observations of the atmosphere, land and oceans in a strategic planning framework
- Use the framework to build collaboration among partners:
 - **A common approach to surface and satellite observations**
 - **Products that respond to needs defined by users**
 - **Identifying gaps in observations**
 - **Exchange information and coordinate efforts**
 - **Harmonizing measurements**





IGOS strategy (2)

- Cost-effectiveness and a relevant socio economic context:
 - **Who are the users (in policy, research, operational services) and what products do they want?**
 - **What data, processing and analysis are required to meet those needs?**
 - **Which observations provide the best data?**
 - **What observing networks are needed to make the observations?**
- Bring together users, who know best what is needed, with data providers who know best what can be produced
- Dialogue between earth observation community and users, such as international conventions, should be ongoing and occupy a central role in an integrated earth observation plan



IGOS Themes

- Process for developing themes :
 - Form a group of interested partners and internationally recognized experts
 - Consult user communities to define needs and products
 - Assess current status of observations
 - Identify gaps in coverage and actions required
- Theme content :
 - Objectives
 - Roles and responsibilities
 - Milestones
 - Evaluation criteria
 - Level of effort required

IGOS Themes



Under implementation :

- Oceans
- Coral reefs sub-theme

Ready for implementation :

- Carbon
- Water
- Geohazards

Advanced development :

- Atmospheric chemistry
- Coastal

Under development :

- Land
- Cryosphere

IGOL - a new IGOS land theme

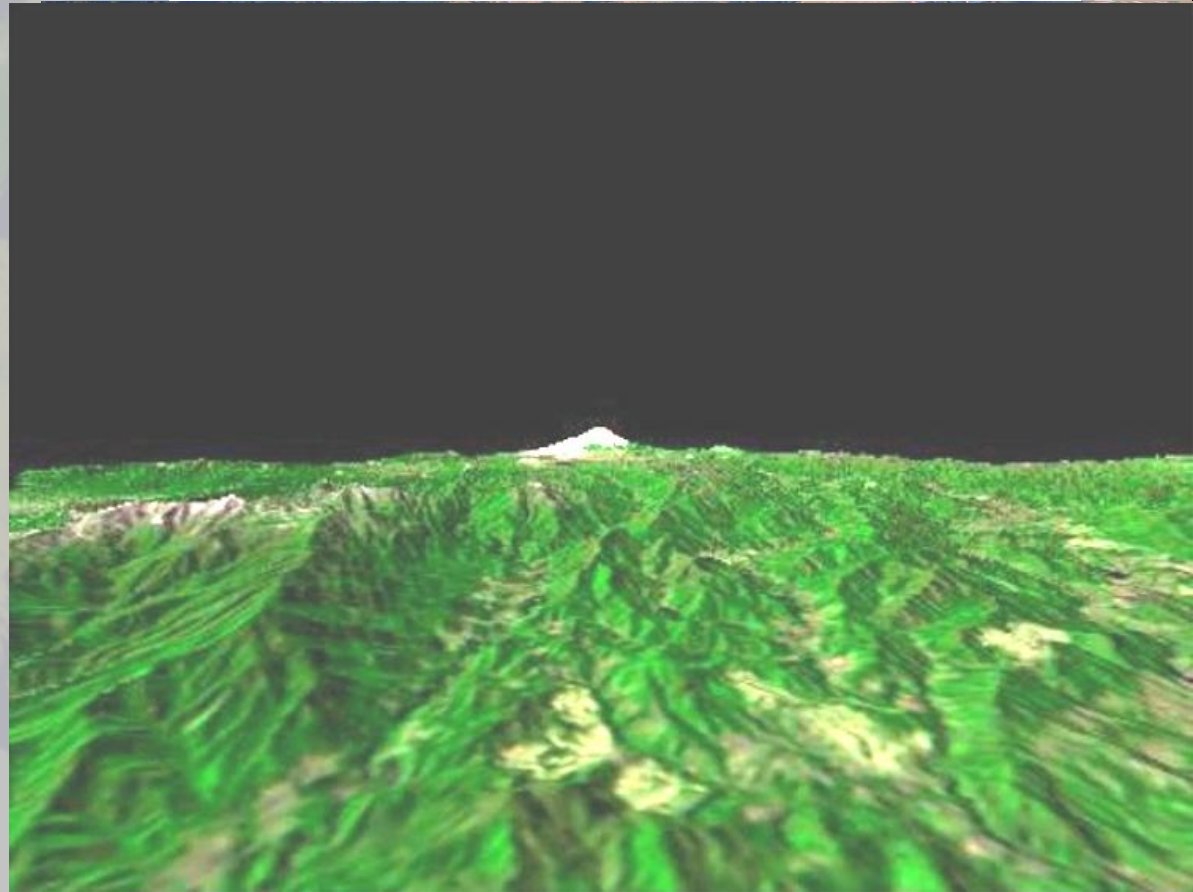


- IGOS - theme documents are primary source of requirements for developing GEOSS
- IGOS-P has not yet considered many observational needs relating to many aspects of the land:
 - Sustainable economic development, natural resources management, conservation and biodiversity, ecosystems (functioning, services), biogeochemical cycling, multilateral environmental agreements (development, implementation), mandatory reporting and monitoring
- Need for a new theme ‘Integrated Global Observations of Land’ with main components:
 - Land cover and land use, human settlement and population, managed ecosystems, agriculture, natural ecosystems, soils, biogeochemical cycles, elevation ...



The main components of a Land theme

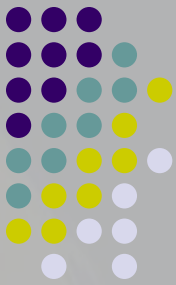
- Land Cover and Land Use
- Human settlement and population
- Agriculture, pastoralism, forestry
- Ecosystems
 - Conservation, biodiversity, sustainable use.
- Soils
- Biogeochemical cycles
- Elevation





Progress since the 11th IGOS-P

- IGOL Theme adopted formally at IGOS-P 11 in May 27, 2004
- Team Organization
 - **Planned team organization, activities and budget**
 - **Formed a team from interested partners and internationally recognized experts**
- 1st IGOL Team Meeting- Sept 13-15, 2004 at FAO:
 - **Defined the scope of IGOL theme and built consensus among team members on theme topics**
 - **Agreed on work organization and timeline**



IGOL Partners

Co-chairs

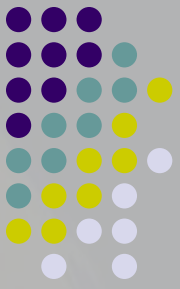


Technical inputs (includes)



Sponsors





IGOL Team members

Team members ;

John Townshend (GOFC-GOLD)

John Latham (GTOS)

Olivier Arino (ESA)

Alan Belward (GCOS)

Jay Feuquay (USGS)

Tony Janetos (Heinz Center)

(GOFC/GOLD) Chris Justice (GOFC/GOLD)
(UNEP)

Jiyuan Liu (CAS)

Roberta B. Miller (CIESEN)

Dennis Ojima (IGBP)

Ake Rosenqvist (JAXA)

Christiana Schmullius

Ashbindu Singh

Jeff Tschirley (FAO)

1st IGOL Meeting

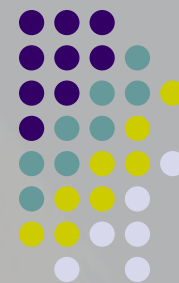
- Review of requirements
 - UNEP and Millenium Development Goals
 - FAO
 - IGBP
 - GOFC/GOLD
 - GCOS/GTOS TOPC
 - MA (Conservation and biodiversity)
 - Soils requirements
 - Socio-economic requirements.
- Review of Capabilities (especially in relation to remote sensing capabilities)
- Identification of deficiencies





IGOL Sub Themes

- Land Cover and Change
 - Inc. Water bodies, Wetlands, **Albedo**
- Land Use and Change (sustainable use is good practice)
 - Urban / Human settlement and population
 - Agriculture
 - Pastoralism
 - Forestry
 - Conservation – incl. Wetlands
 - **Related Human Health issues**
- Soils –inc. Degradation
- Biodiversity
- *Biogeochemical cycles ?*
- Elevation / Physiography



Work Plans

- Develop Statement on enhancement needs – get consensus of drafts (**Nov/Dec**) – **Chair / Secretariat**
- Pull together and summarize needs/requirements from existing programmes requirements studies for biodiversity, soils, land degradation, food security, health, wetlands (**Oct - Dec**) – **Secretariat**
- Writing assignments for Team Members to Draft Specific Sections (**Nov- Feb**)
- Next Meeting (**March/April**– offers from USGS/NRSCC/ESA)
- First Draft of IGOL Theme Report to be completed by **July '05**
- Document Submitted **Dec 05**

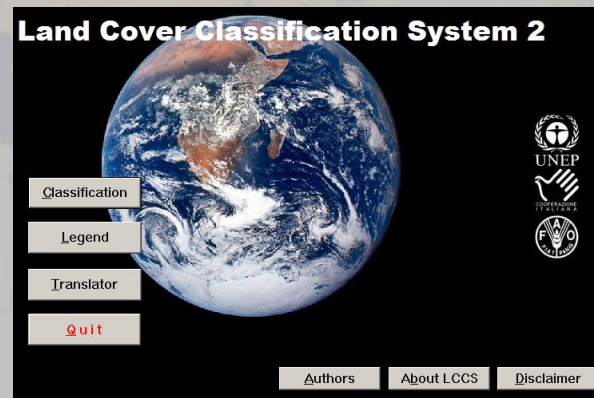
Extra slides



FAO Land cover classification system (LCCS)



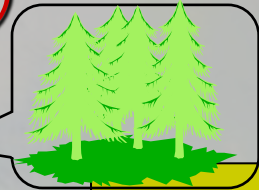
- FAO standards common (soil maps harmonization)
- Classification system to describe land cover features worldwide at any scale or level of detail
- High level of *flexibility* with an absolute level of *standardization* of definitions between different users
- Proper definition of mixed units:
 - Cartographic mixture
 - Thematic mixture
 - Temporal mixture
 - Layering
- LCCS TO ISO TC211
- Software available online



Basic concept of a land cover class (*the idea*)



- trees ? shrubs
- closed herbaceous ?
- ? open sparse
- broadleaved evergreen



Defined geographic area

Reference Classification System

	>50m				30m				>5m			
	1	2	3	4...	1	2	3	4...	1	2	3	4...
100%												
			33					47				
											78	
		83										
10%									97	98	99	100

LCCS method (*the language*)

Legend development in LCCS code (*the concept expression*)

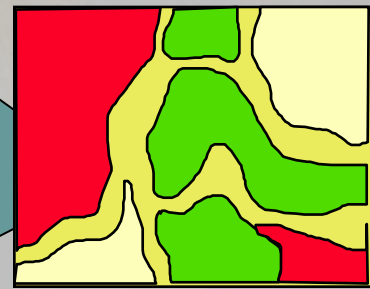


Legend development in LCCS code (*the concept expression*)

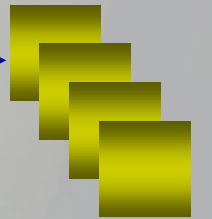
- Trees A3
- Closed A10
- Height 14-7m B6
- Needleleaved D2
- Evergreen E1

=A3+A10+B6+D2+E1

Interpretation process (*the map product*)



Mapping units



End users

GOFC-GOLD focus



1) Multifaceted international strategy

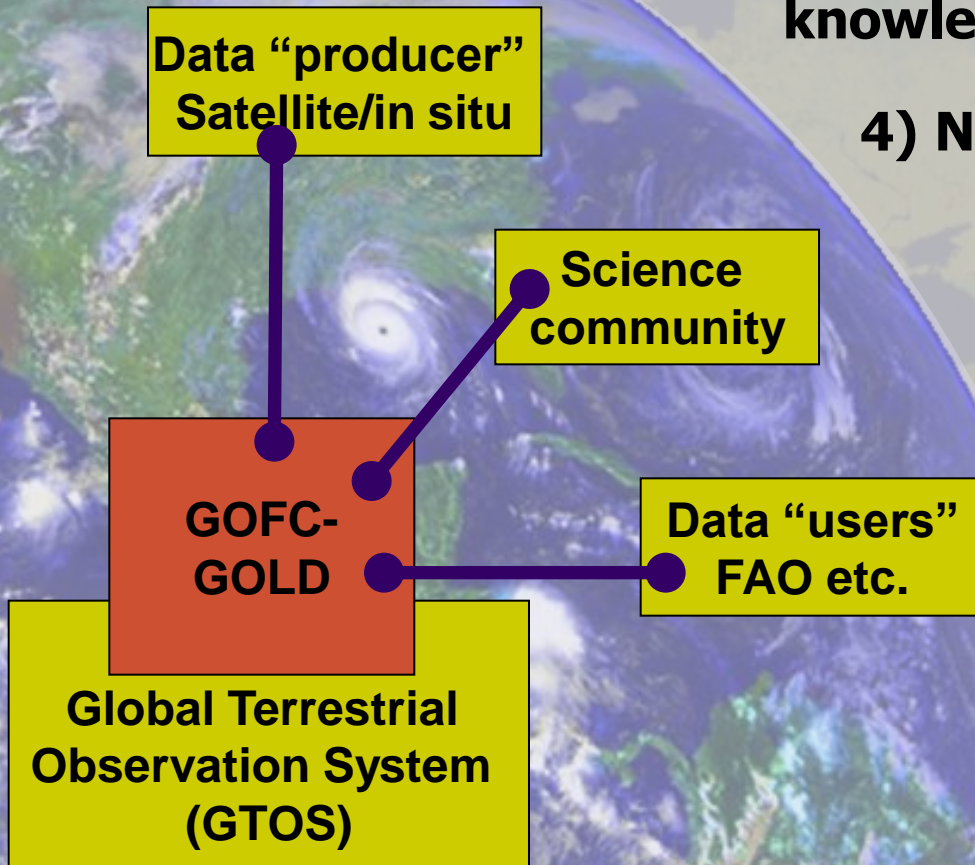
2) Continuous operational observation of land

3) Vision to share data, information and knowledge

4) Network of coordinated research

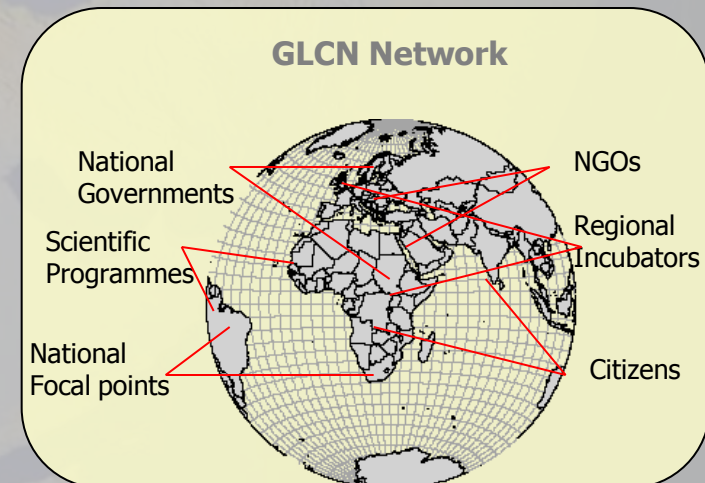
5) Establishment of international standards

6) Improved match between data products and user needs



Global Land Cover Network (GLCN)

- Common effort of FAO and UNEP to answer the need for a global land cover standardized data base
- Based on the recommendations of the Agenda 21 for coordinated, systematic and harmonized collection and assessment of data
- Objective: provide direction, focus and guidance for harmonized land cover classification and mapping strategy at national, regional and global levels
- Launched at the conference “Strategies for Global Land Cover Mapping and Monitoring” in Florence 2002 (Artimino declaration)
- Based on remote sensing and GIS
- Driven by standards
- First example of an operational global initiative in the domain of geographic information



Summary of Current Fire IT Developments



Fire detection and monitoring

- Daily global active-fire products in near-real time by MODIS Rapid Response System
- Data and imagery are being made available over the Web to GOFC-GOLD partners
- Geostationary Operational Environmental Satellites (GOES)-based Automated Biomass Burning Algorithm (ABBA) system adapted for use by European MSG
- Workshops held to establish a network of geostationary operational satellites detecting active fires

Burned area mapping

- remote-sensing-derived products delimiting recently burned areas have been created and distributed for preliminary evaluation - Global Burnt Area 2000, GLOBSCAR

New technology development

- Evaluation and application development of the Bi-spectral Infrared Detection (BIRD) small satellite technology
- Partnerships formed for international involvement in the development of the planned operational USA National Polar-orbiting Operational Environmental Satellite System (NPOESS)

Continuing collaboration

- Global Fire Monitoring Centre
- United Nations International Strategy for Disaster Reduction Working Group 4 on