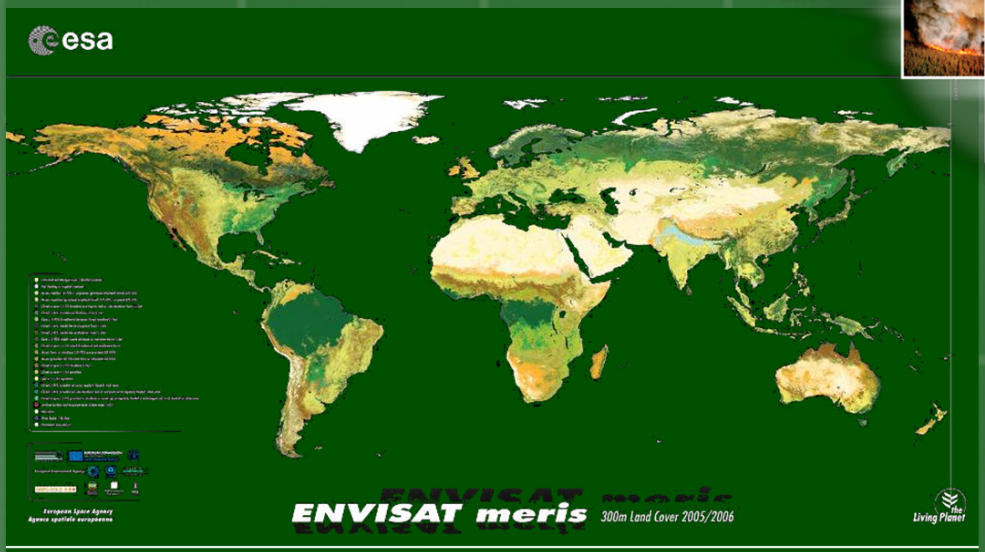
GOFC-GOLD

Global Observation of Forest and Land Cover Dynamics



Land Cover Project Office

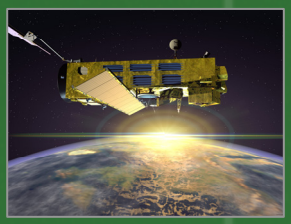
Annual Report 2007

January 2008

esa

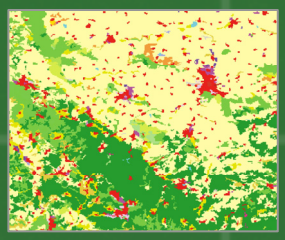
GOFC-GOLD

Observations

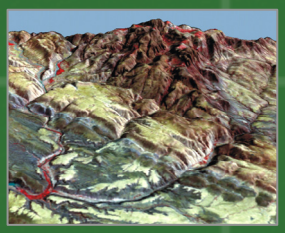


Mapping

Monitoring



Modeling



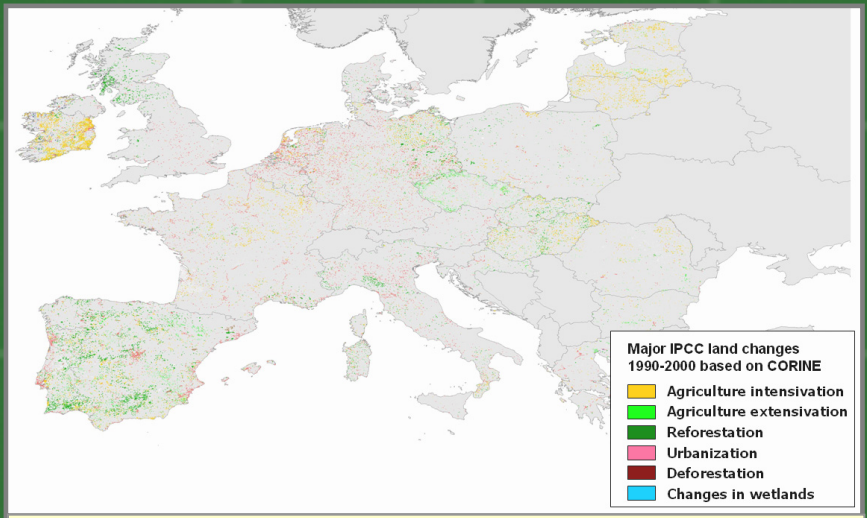
Overview

In its fourth year of operation, the GOFC-GOLD land cover project office (LC-PO) was able to successfully fulfill the requirements and challenges posed by the international community and ESA as contracting agency. The project office has further evolved to an established international focal point for global and regional land cover observations, and is a key actor of GOFC-GOLD implementation towards operational land monitoring globally and on the European level. Such reliable environmental observations are of crucial importance to understanding climate change and its impacts, to sustainable development, natural resources management, conservation, biodiversity and understanding of ecosystems and biogeochemical cycling.

GOFC-GOLD (Global Observation of Forest Cover - Global Observation of Land Dynamics) as technical panel of the Global Terrestrial Observing System (GTOS) provides the platform for international communication and cooperation for actors involved in global Earth Observation including data producers (e.g. space agencies, land cover facilities), the scientific community, and data users (FAO, UNEP, global modeling community etc.). These activities improve the value of current and future land cover datasets for a multitude of applications and contribute to the overall goal of operational observations of the land surface.

We would like to thank you and your colleagues for your efforts over the last year in making an operational GOFC-GOLD Land Cover Office in Jena. Your activities have made an important contribution in the international arena of land cover and related issues. In particular your support to the activities of the Global Land Cover Network (GLCN) and the Global terrestrial Observing System (GTOS) are appreciated.

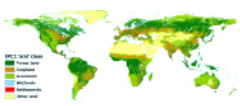
Dr. John Latham, Executive Director of the Global Terrestrial Observing System of the United Nations



The GOFC-GOLD land cover project office is providing a platform to discuss and implement strategies for global and regional land cover harmonization and dataset interoperability (i.e. CORINE land cover, UN LCCS), land cover product definitions, applications and validation.

Dr. Chris Steenmans, European Environmental Agency (EEA)

Contribution to international activities

	GOFC-GOLD land cover project office involvement	*Major achievements in 2007*
	Group on Earth Observation: Coordination of land cover tasks in the GEO work plan and participation in the Community of Practice for forest observation.	• *GEO 2007-2009 workplan task (DA-07-02) on global land cover recognized as GEO early success story global land cover* • *Participation and contribution GEO ministerial summit (poster display at venue, lead authorship for land cover and fire chapters in summit publication)*
	Integrated Global Observation of Land (IGOL): Evolution of a new and first land theme of the Integrated Global Observation Strategy (IGOS).	• *GOFC-GOLD major contributor to development of IGOL report* • *Presentation and approval of IGOL document by IGOS plenary and GEO*
	Global Climate Observing System: Implementing the UNFCCC plan for systematic research and observations of essential climate variables (ECV) including land cover and fire.	• *Contribution to land cover tasks and development of reporting standards (GTOS, UNFCCC/SBSTA mandate)* • *Participation in UNFCCC-COP13 and SBSTA 26/27, including LC-PO presentation on GTOS/FAO side event on ECV observation progress*
	United Nations Framework Convention on Climate Change: Coordination of a special working group on forest monitoring for reducing emissions from deforestation (REDD).	• *Coordination of working group to evolve internationally agreed technical Earth observation protocols for REDD implementation* • *Organization of REDD workshops (Bolivia, April 2007) & UNFCCC side events (May+Dec)* • *Delivery of draft technical sourcebook for REDD implementation at UNFCCC/COP 13 in Bali*
	ESA-GLOBCOVER Project: Participation in ongoing global land cover mapping for increasing detail, accuracy and usability of existing maps.	• *Contribution to GLOBCOVER legend development and validation framework* • *Coordinate user feedback on GLOBCOVER image mosaics* • *Promotion of GLOBCOVER as contribution to GCOS implementation plan and GEO tasks*
	**Harmonization & Validation Initiative**: Activities towards synergy and improved usability of land cover products	• *Translation, and comparison of several land cover legends* • *Refine implementation plan for an operational validation strategy to develop a synergetic "best available" global land cover map*
	**Regional networking and capacity building:** Hosting and organization of a number of workshops and capacity building events involving the GOFC-GOLD regional networks.	• *GOFC-GOLD science meetings (Boston, October 2007) and capacity building workshop with GOFC-GOLD regional networks* • *Regional network engagement in global validation exercises*

GROUP ON EARTH OBSERVATIONS

Societal benefits from land cover observations

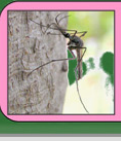
Water
- Water resources & quality
- Land & water use pattern & management

Climate
- Land change & greenhouse gas emissions
- Water & energy exchanges

Weather
- Land surface & climate interactions
- Vegetation characteristics

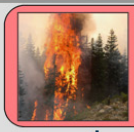
Energy
- Bio-energy & biomass
- Wind & hydro power assessments

Ecosystems
- Changing environmental conditions
- Services & accounting



Health
- Land change & vector-borne diseases
- Boundary conditions/risks

Agriculture
- Cultivation pattern & forestry
- Land degradations



Disasters
- Fire monitoring/risks
- Land degradation assessments

Biodiversity
- Ecosystem characteristics & changes
- Habitat assessments

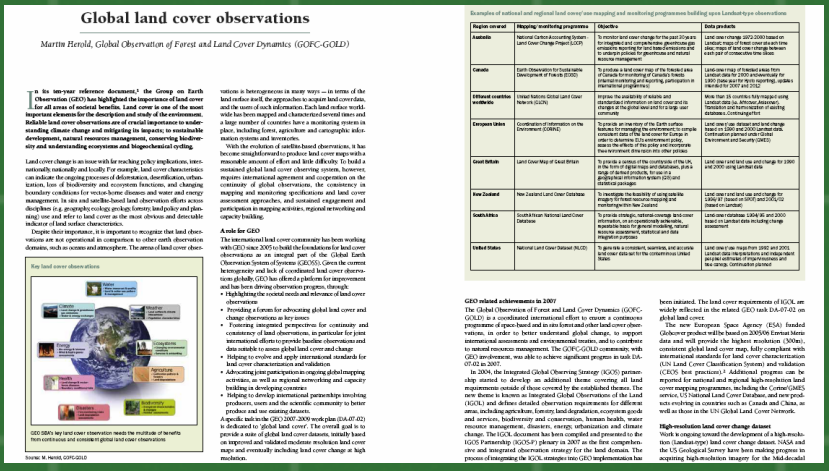
Taking on the GEO challenges

- GOFC-GOLD provides an operational framework for land observations within GTOS.
- The land domain is least advanced compared to other fields of observation (ocean, atmosphere).
- GOFC-GOLD provides a communication and cooperation platform between data producers, data users, and the science community to cooperatively improve observation, data products definition, assimilation, and dissemination.
- Implementation builds upon and enhances established partnerships and observing systems, and stable funding and staffing is essential for a comprehensive GEOSS implementation.
- **Potential of international capacity building (linkage to GOFC-GOLD regional networks).**

GEO aims to achieve Earth Observation advances in nine specific areas of socio-economic benefit (see above for land cover).

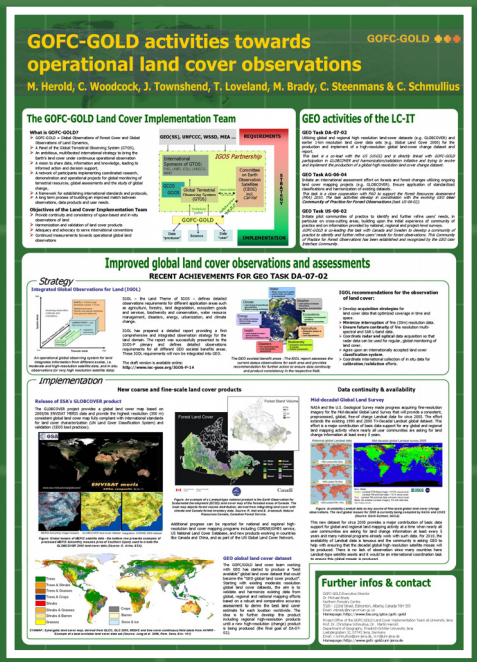
*There are several commonly required and used products among the nine societal benefit areas (Disasters, Health, Energy, Climate, Water, Weather, Ecosystems, Agriculture and Biodiversity). All areas require **land cover** products.*

(GEO Implementation Plan, 2005)



Global land cover observations

Martin Herold, Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD)



GOFC-GOLD activities towards operational land cover observations

M. Herold, C. Woodcock, J. Townshend, T. Loveland, M. Brady, C. Steenmans & C. Schmullius

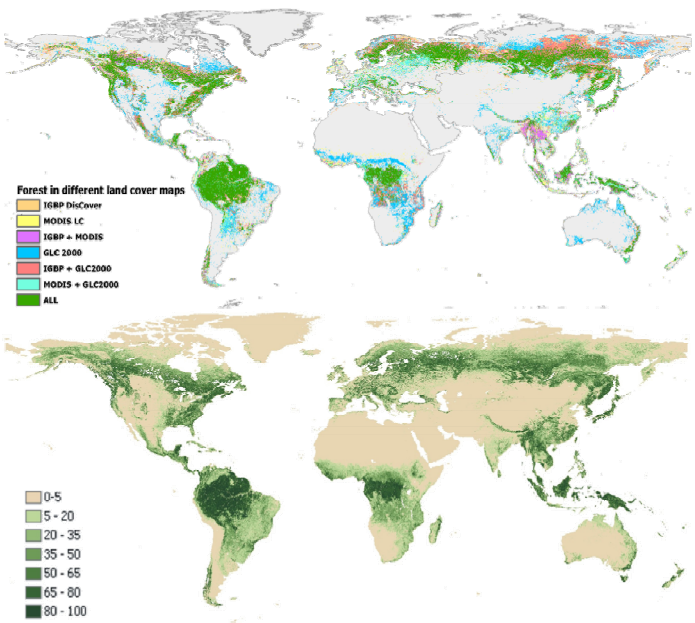
The GOFC-GOLD activities have been recognized as GEO early success stories and presented at the ministerial summit through contributions in the summit book (above) and poster presentations (left)

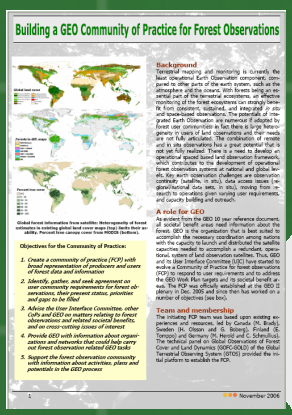
Tasks in the GEO 2007-09 work plan where the ESA LC-PO has taken the lead implementation role:

DATA/ARCHITECTURE-07-02: Provide a suite of global land cover datasets, initially based on improved and validated moderate resolution land cover maps and eventually including land-cover change at high resolution.

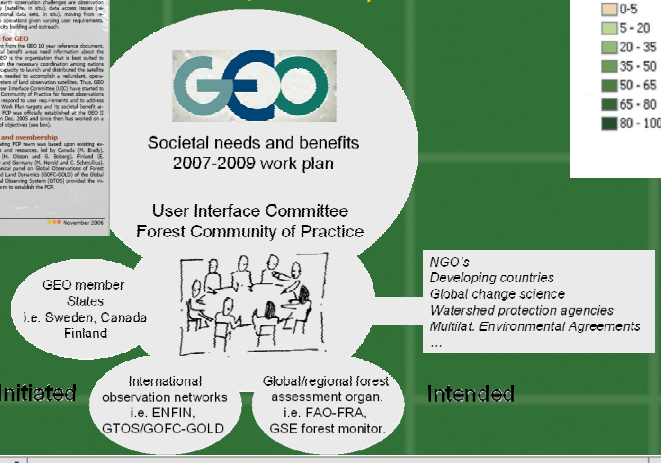
AGRICULTURE-06-04: Initiate an international assessment effort on forests and forest changes utilizing ongoing land cover mapping projects (e.g. GLOBCOVER). Ensure application of standardized classifications and harmonization of existing datasets.

Global forest information from satellite: Differences in forest estimates in existing global land cover maps (top) limits their usability. Percent tree canopy cover (bottom).





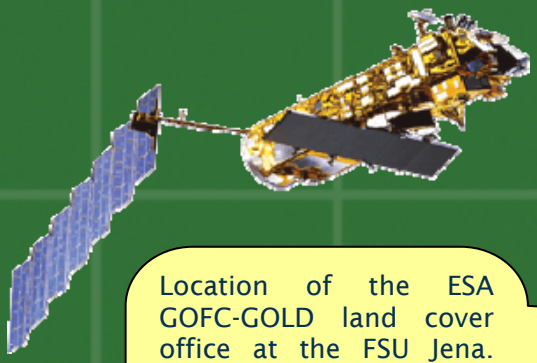
Concept of the GEO community of practice for forest observations presented at GEO III plenary in November 2006 in Bonn, Germany

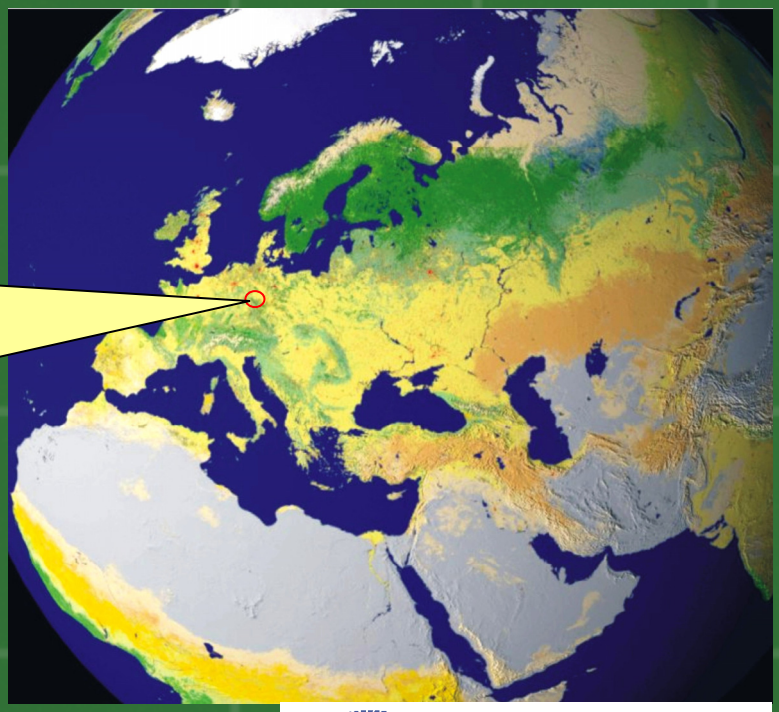


GEO: societal benefits	Key land cover observations and desired products	Relevant observation needs requirements
DISASTERS	▪ Fire monitoring ▪ Surface cover type changes and land degradations due to disasters	▪ Fire observations: early warning (i.e. fuel conditions), active fire, burned area/intensity ▪ Location of population and infrastructure
HEALTH	▪ Land characteristics/change for disease vectors ▪ Land cover/change affecting environmental boundary conditions ▪ Demographic and socio-economic conditions	▪ Location and extent of settlement patterns ▪ Land use, socio-economic and demographic characteristics ▪ Vegetation characteristics and riparian conditions
ENERGY	▪ Bio-fuel production sustainability ▪ Assessments for wind and hydro power generation and explorations	▪ Biomass yield estimates (forestry and agriculture) ▪ Location and extent of energy consumption
CLIMATE	▪ Greenhouse gas emissions caused by land cover change ▪ Land cover dynamics forcing water and energy exchanges	▪ Changes in natural vegetation distributions and land use ▪ Terrestrial carbon stocks and fluxes, biophysical properties, and phenology
WATER	▪ Land cover change affecting dynamics the hydrological system ▪ Available water resources and quality	▪ Distribution of water bodies and wetlands ▪ Water use pattern (i.e. irrigation, vegetation stress) and infrastructure
WEATHER	▪ Land cover/change affecting radiation balance + sensible heat exchange ▪ Land surface roughness	▪ Biophysical vegetation characteristics and phenology ▪ Change of weather-relevant land cover characteristics
ECOSYSTEMS	▪ Human alterations in natural ecosystem development ▪ Changes in environmental conditions and provision of ecosystem services ▪ Monitoring ecosystem conservation	▪ Land cover and vegetation characteristics and changes ▪ Land use dynamics and driving processes
AGRICULTURE	▪ Distribution of cultivation practices and crop production ▪ Land degradations and threats terrestrial resources and productivity	▪ Monitoring of food crops (type, rotations, conditions) ▪ Forest types and changes (ie logging) ▪ Land cover and use changes affecting agriculture and forestry
BIODIVERSITY	▪ Trends in extent of selected ecosystems, habitats, and species ▪ Connectivity and fragmentation of ecosystems	▪ Ecosystem characterization and vegetation monitoring (types, species) ▪ Habitat characteristics and fragmentation of invasive and protected species ▪ Changes in land cover and use threatening biodiversity

The table links the GEO areas of societal benefits with global land cover observation requirements

European Space Agency Sponsorship





Location of the ESA GOFC-GOLD land cover office at the FSU Jena. The office is led by Prof. Christiane C. Schmullius, the Co-chair of the GOFC-GOLD Land Cover Implementation Team, and coordinated by Dr. Martin Herold.

With the establishment of a GOFC-GOLD land cover project office at the Friedrich Schiller University Jena, Germany, the European Space Agency has taken responsibility to participate and contribute to the international cooperation and communication to coordinate and improve global observations of land. The Land Cover Project Office (PO) helps to strengthen the GOFC-GOLD framework, to coordinate, promote and fulfil the GOFC-GOLD Land Cover implementation plan, and to support the European Space Agency and related projects and services. ESA has invested K€ 240 over a 3 year period (2004-2006) and is investing K€ 200 to support the LC-PO. In conjunction with the extensive ENVISAT data acquisitions and several regional and global mapping activities (e.g. GLOBCOVER), ESA has strengthened its position in coordination of land observations and extended their activities for an improved match between data products and user needs.

The ESA LC-PO office is led by Prof. Christiane Schmullius, the Co-chair of the GOFC-GOLD Land Cover Implementation Team (LC-IT) jointly with Curtis Woodcock from Boston University. The Project Office is located at the Department of Geoinformatics of the Friedrich Schiller University in Jena, Germany. The management, coordination and execution of the GOFC-GOLD activities close cooperation with the GOFC-GOLD-chairs Tony Janetos and Philippe Mayaux, as well as, the GOFC-GOLD executive office in Edmonton, Canada led by Michael Brady.

Despite fostering the implementation of GOFC-GOLD objectives, a major objective of the PO is to support ESA in the coordination of land cover harmonization and validation activities focused on the development of a user information service for the reporting and exchange of validation results and information relating to the operational activities of satellite platforms and data delivery (GLOBCARBON and GLOBCOVER projects).

Key activities and achievements

- **State of the art in global land cover assessment**
  - Summarize published materials and datasets accessible through the LC-PO website
  - Documentation on land cover algorithms, change routines, data products, in situ facilities
- **Strategies for land cover harmonization and dataset interoperability**
  - Review of previous land cover harmonization approaches including advocating the UN Land Cover Classification System as common ground for land characterization
  - Translation, and comparison of several land cover legends
  - Development of strategic documents for land cover harmonization activities
- **Global land cover validation strategies**
  - Strong cooperation with CEOS Cal-Val group on development of validation standards
  - Participation in validation activities (GLOBCOVER) and comparative accuracy assessment of existing global datasets using existing reference information (scientific publication)
  - Outline implementation plan for an operational validation strategy to assess the accuracy of existing and future global land cover products and foster their interoperability/synergy
- **Land cover map product applications**
  - Develop advanced and refined global land cover maps for global process modeling
  - Dataset synergy for coarse scale land change analysis and long term trends
- **Completion and approval of IGOS-P "land theme"**
  - GOFC-GOLD major contributor to develop "Integrated Global Observations for Land" (IGOL)
  - Approval of IGOL by IGOS plenary and GEO
- **Support development of GLOBCOVER**
  - Comparative assessment of GLC2000 and CORINE for flexible development of GLOBCOVER
  - Contribution to GLOBCOVER legend development and validation framework
  - Promotion of GLOBCOVER as contribution to GCOS implementation plan and GEO tasks
- **Participation in GEO process**
  - LC-PO acts as point of contact for global land cover (DA-07-02) and forest monitoring (AG-06-04) tasks in the GEO 2007-2009 workplan activities
  - Participation in GEO meetings and contribution to 2007 GEO ministerial summit (poster display at venue, lead authorship for land cover and fire chapters in summit publication)
- **Earth observation to support UN conventions and GCOS implementation plan**
  - Active contribution for land cover task described in the GCOS implementation plan
  - Participation in delegations to UNFCCC-COP13 and SBSTA 26/27 (Side events)
- **UNFCCC support on Reducing emissions from deforestation:**
  - Coordination of GOFC-GOLD working group to evolve internationally agreed technical protocols for using Earth observation in monitoring avoided tropical deforestation
  - Organization of REDD workshops (Bolivia, April 2007) and UNFCCC side events (2)
  - Delivery of draft technical sourcebook for REDD implementation at UNFCCC/COP 13 in Bali
- **Participation in key events to foster international cooperation**
  - GOFC-GOLD science meetings and capacity building
  - Contacts and communications with GOFC-GOLD regional networks
  - Participation in meetings and workshops on: GLOBCOVER meetings, UNFCCC, GTOS, IGOS-IGOL, GEOLAND, DLR, scientific conferences
- **Documentation, publication, and outreach:**
  - 12 deliverables submitted to ESA
  - Maintenance of webpage and development and distribution of four GOFC-GOLD newsletters
  - Contribution to GOFC-GOLD report series (2 published)
  - Scientific publications (3 peer-reviewed papers published, 1 accepted, 2 submitted)

How to make land observations operational and useful to multifaceted applications?

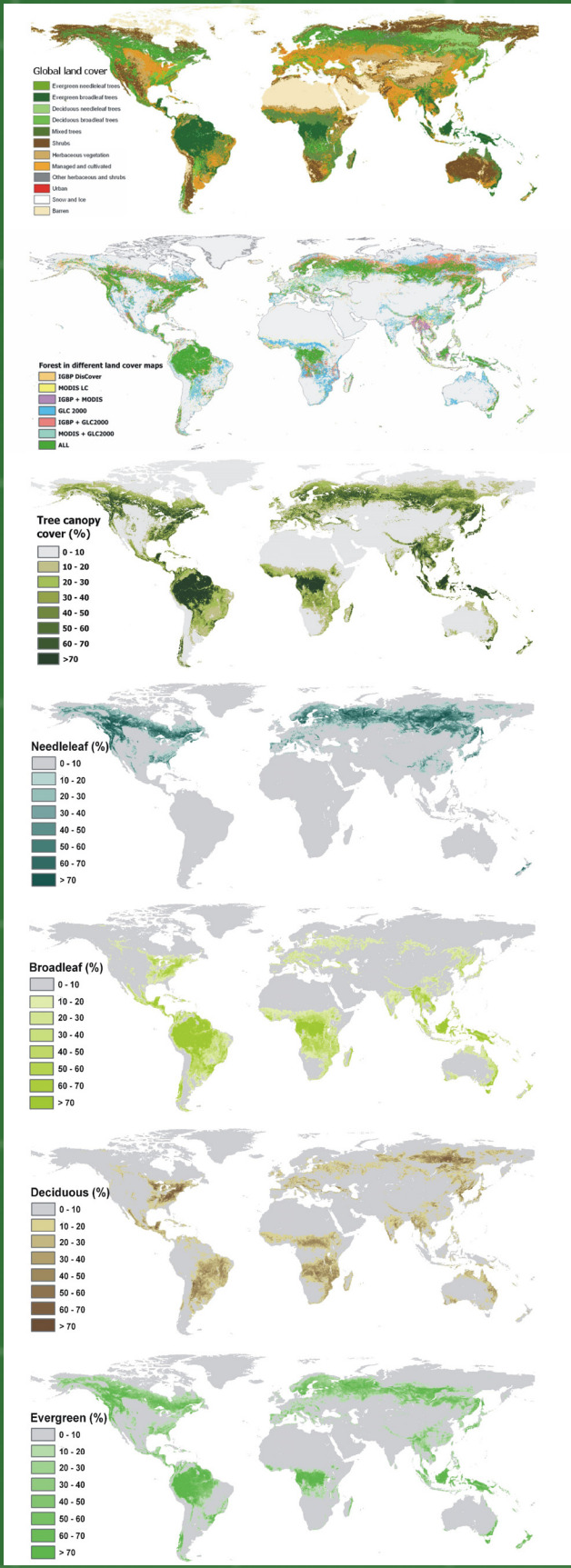
The Challenge:

- Growing need for detailed and accurate information about land cover and land cover change on all geographic scales
- Need to move from research to operational monitoring capabilities for land cover
- Need for operational data and product suites, better defined, flexible, and openly available

GOFC-GOLD –
A platform for an international partnership of data producers, the science community, and users

The GOFC-GOLD Approach:

- Improved match between observations, data products and user needs
- Support of coordination mechanisms for land surface observations
- Establish international standards and protocols especially with respect to harmonization and validation
- Improve adequacy and advocacy of land cover products based on user requirements
- Maintain GOFC-GOLD regional networks
- Work towards continuity and consistency of land cover observations
- Implement coordinated research, demonstration and operational projects
- Support to share data, information and knowledge



As shown above, a multitude of global forest information from satellite observations are available. The GOFC-GOLD challenge is to ensure they are flexible, comparable, and available to satisfy the needs of a large user community.

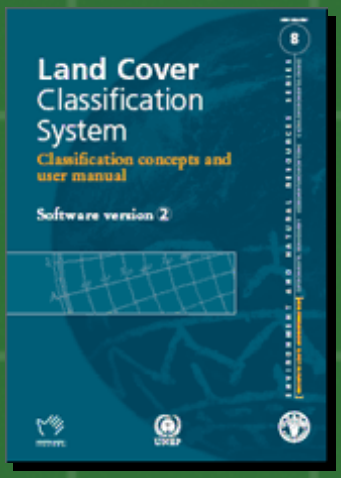
Involving a global network of partners

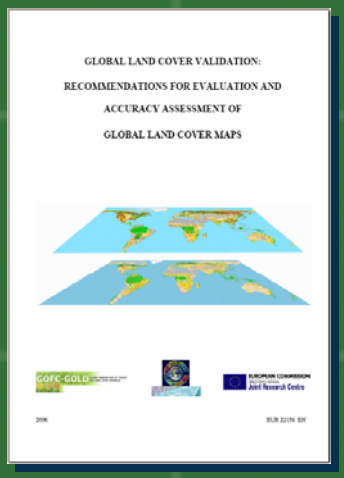
Participants at the 2nd GOFC-GOLD Workshop on Tropical deforestation, organized by the LC-PO in April 2007, in St. Cruz, Bolivia

Standards for land cover harmonization and validation

Lack of harmonization and validation hinders the flexibility and usability of land cover datasets; in particular considering the large number of users and applications including the analysis of land changes. The GOFC-GOLD PO has fostered the harmonization and standardized development of land cover datasets including the use of the UN Land Cover Classification System (LCCS), legend translations, and dataset harmonization. GOFC-GOLD has contributed to the development and dissemination of standard validation protocols and frameworks for their operational implementation.

For example, in 2007 the LC-PO has contributed to LCCS capacity building, completed a thorough translation of the European CORINE land cover legend. The results have been presented and discussed during a targeted tutorial workshop. Together with the CEOS Cal-Val working group the LC-PO has released a consensus technical document for global land cover validation.



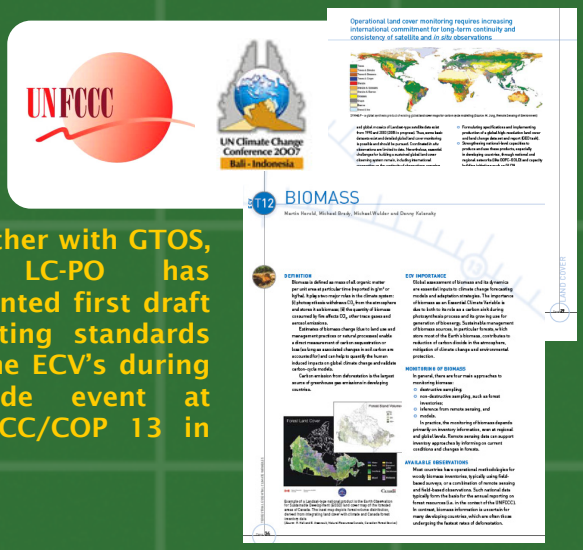


Activities to support UN Conventions

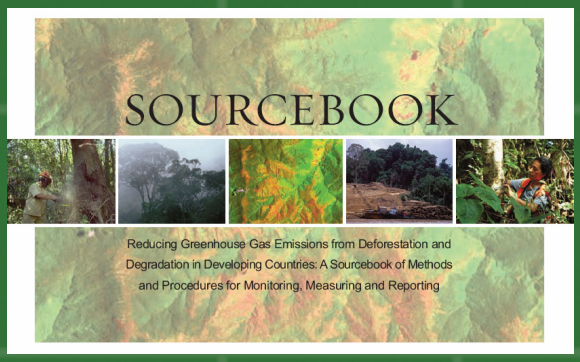
GOFC-GOLD activities are guided and outlined in several international agreements and UN conventions. In the **GCOS implementation plan** to the UNFCCC calls for GOFC-GOLD support with respect to land cover observations and reporting standards.

Major activities of LC-PO in 2007 have been dedicated to the issue of **reducing GHG emissions from deforestation in developing countries**. International negotiations are currently underway within the UNFCCC to build incentives for developing countries to avoid deforestation. A key issue is the technical feasibility of determining historical deforestation rates and monitoring future land change that would enable tropical countries to obtain carbon credits for reducing deforestation.

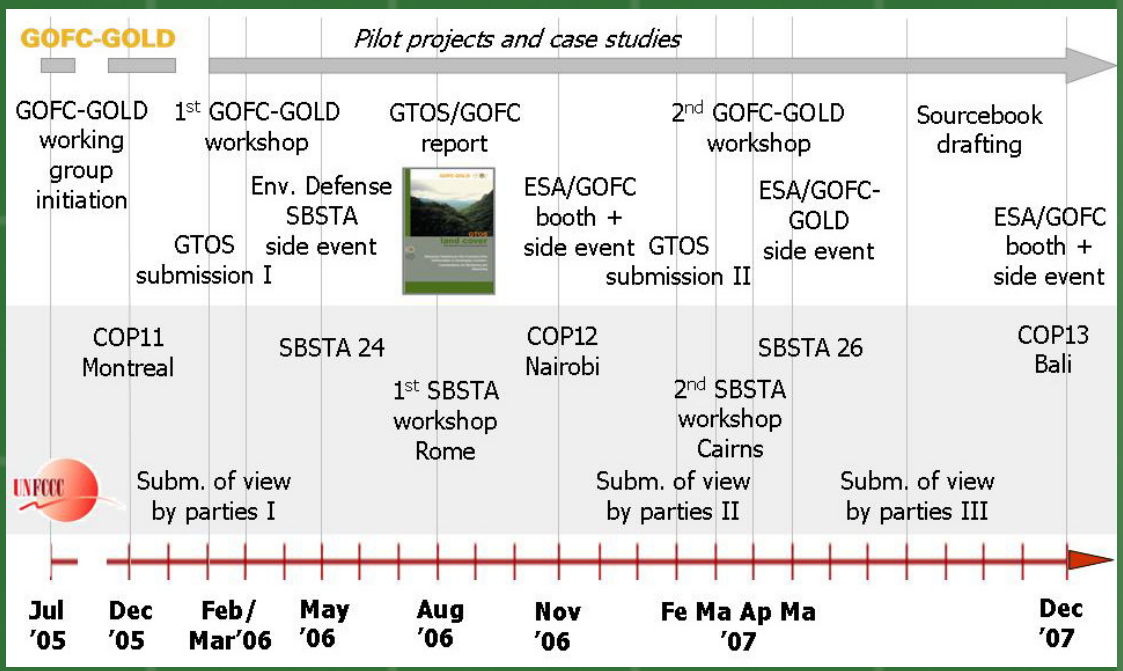
GOFC-GOLD has established a working group to assess satellite observation capabilities and develop consensus technical guidelines for operational implementation of such policy in the post 2012 period. A related technical sourcebook draft has been developed (see to the right). The report was presented to the UNFCCC COP 13 in Bali and the adjacent CIFOR forest day and has been well recognized in the policy discussion process.



Together with GTOS, the LC-PO has presented first draft reporting standards for the ECV's during a side event at UNFCCC/COP 13 in Bali.

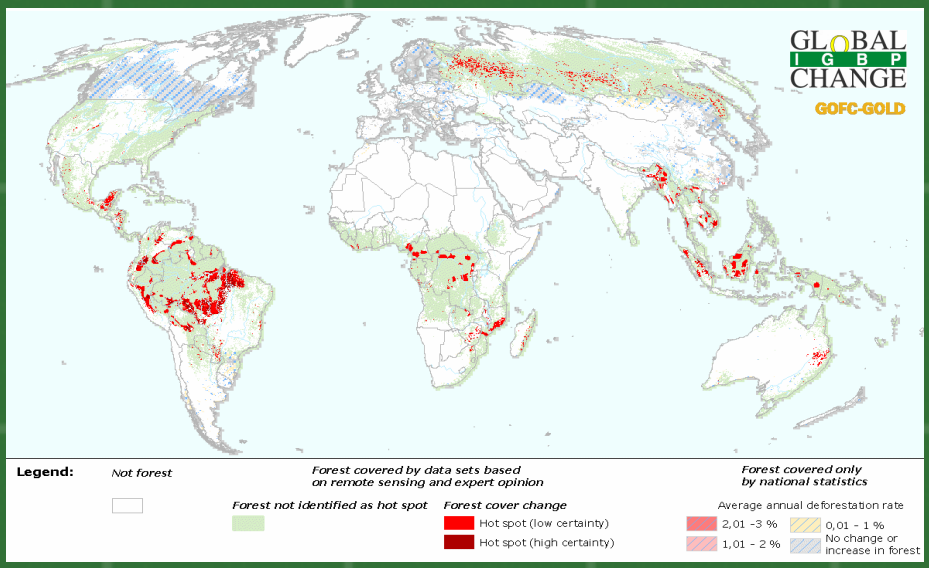


Consensus technical document for monitoring carbon emissions from deforestation from space prepared by GOFC-GOLD working group as input to UNFCCC negotiations and to support REDD implementation activities



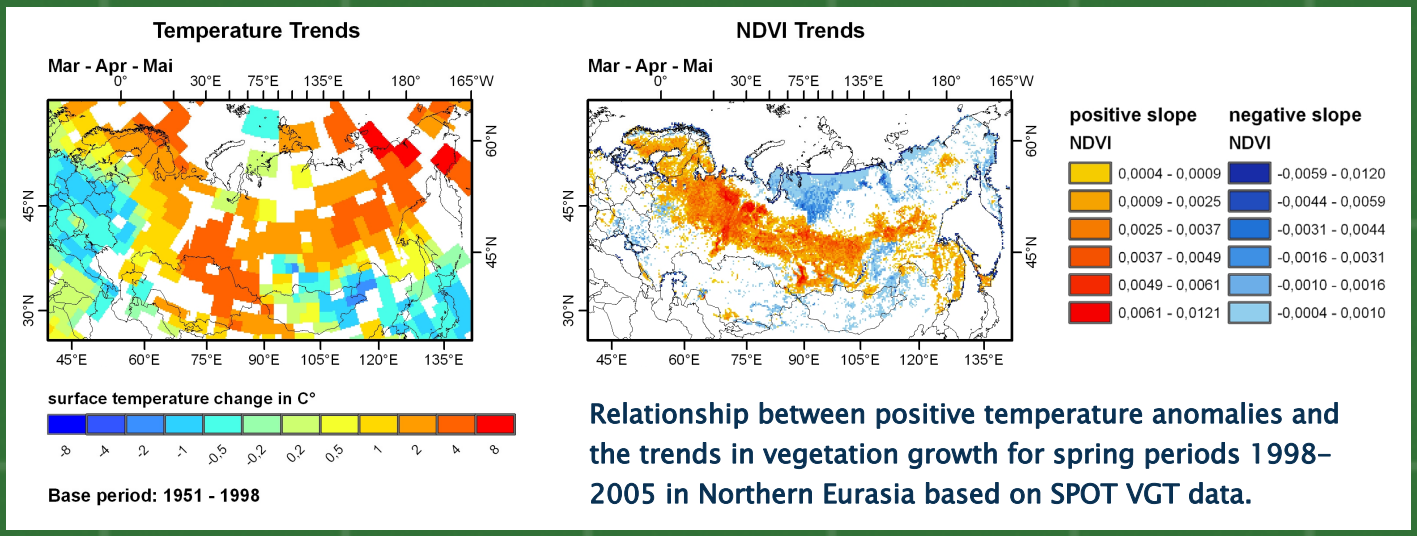
This timeline shows the ongoing contribution and commitment of the GOFC-GOLD PO to support the UNFCCC REDD process. Since 2005, the PO has organized workshops, and published dedicated technical reports that have been communicated to the UNFCCC negotiations and implementation actors through GTOS submissions and side events. In 2007, joint side events with ESA were held at UNFCCC/SBSTA 26 and 27 and at the CIFOR forest day adjacent to the COP13 in Bali.

Land cover data to study global change



Hot spots of forest change 1980–2000 derived as part of a joint IGBP LUCC and GOFC-GOLD activity. The dataset emphasizes the aggregated information of forest cover change indicators from a synergy for different regional and global datasets.

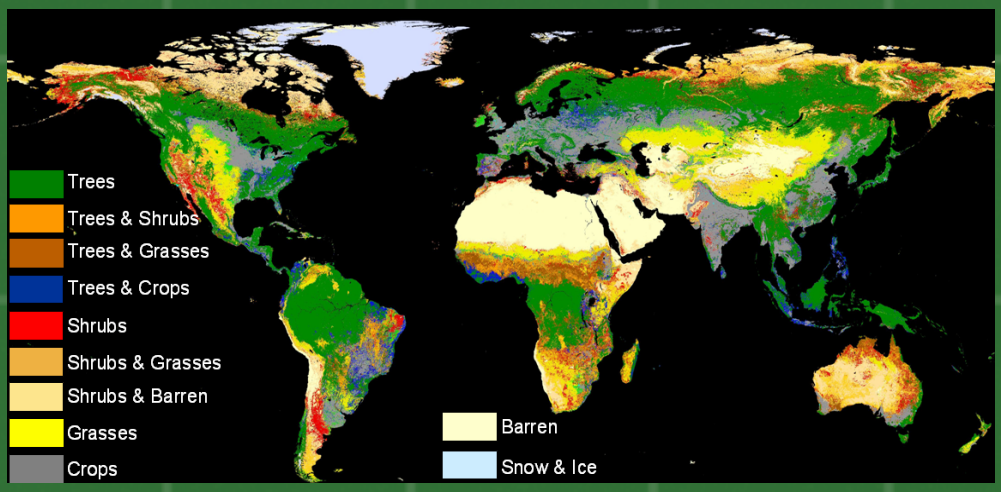
Source: Lepers, E., E.F. Lambin, A.C. Janetos, R. DeFries, F. Achard, N. Ramankutty and R.J. Scholes (2005). A synthesis of information on rapid land-cover change for the period 1981–2000. BioScience, 55 (2), 115–124



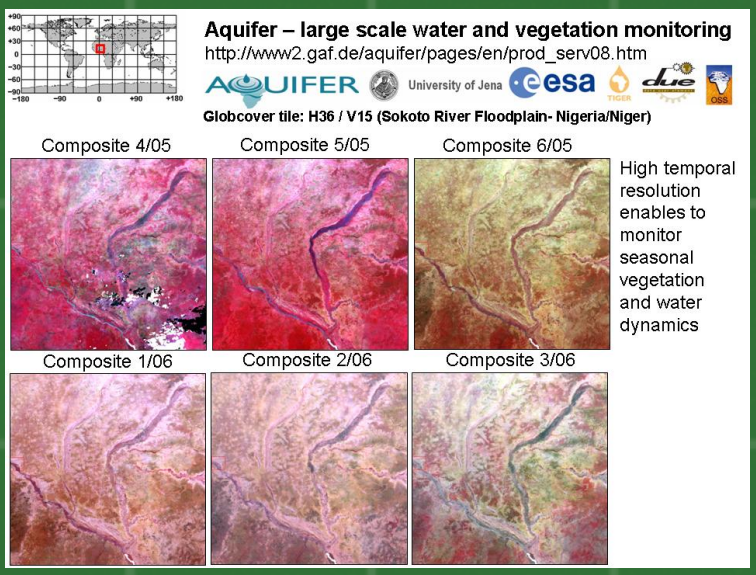
Relationship between positive temperature anomalies and the trends in vegetation growth for spring periods 1998–2005 in Northern Eurasia based on SPOT VGT data.

Synergy dataset of existing global land cover maps for carbon cycle modeling to provide best estimate for land cover characteristics. Leaf attributes of trees are not shown for reasons of visibility but are defined for each class.

(Source: Jung, M., Henkel, K., Herold, M., and G. Churkina (2006). Exploiting synergies of global land cover products for carbon cycle modeling, Remote Sensing of Environment, 101, 4, 534–553.).



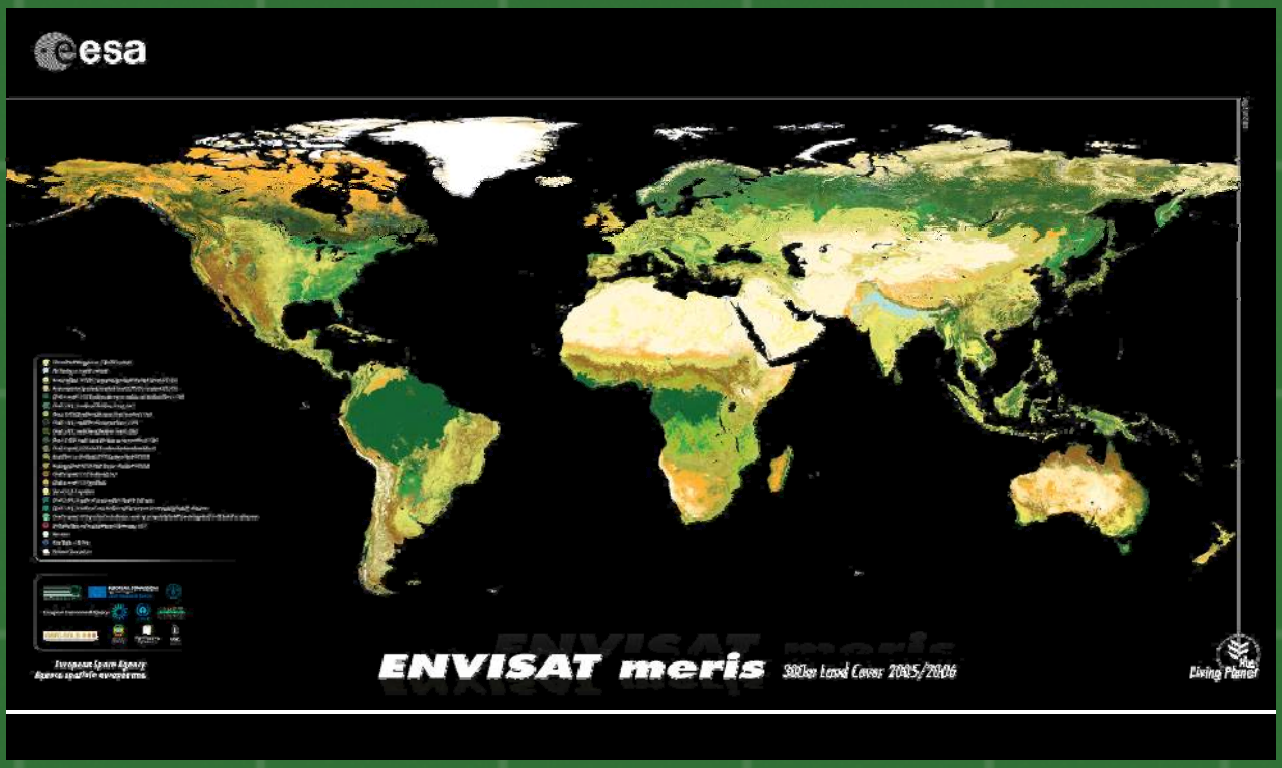
Supporting ESA land cover initiatives



The LC-PO is providing user feedback on released GLOBCOVER products. In this case, the assessment of global bi-monthly MERIS image mosaics through regional land cover mapping and monitoring programs (ESA Acquifer working in Africa)

The GLOBCOVER project, launched in 2004, is an ESA initiative led by an international network of partners, in particular ESA, FAO, UNEP, JRC, IGBP and GOFC-GOLD. The objective is to produce a global land-cover map for the year 2005, using fine resolution (300 m) ENVISAT-MERIS data acquired over the full year 2005 and parts of 2006. This new product is intended to update and to complement other existing comparable global products, such as the global land cover map for the year 2000 with 1 km resolution.

The GLOBCOVER project provides an opportunity to implement the GOFC-GOLD objectives for harmonized and validated land cover mapping and the LC-PO plays an active role in the coordination and development of the products. It participates at project meetings and assists the ESA in GLOBCOVER legend development, validation and user assessment. The LC-PO completed a comparative assessment of GLC2000 and CORINE2000, and provided coordinated user feedback for released GLOBCOVER image and map products.



The first GLOBCOVER land cover classification based on ENVISAT MERIS data was presented with GOFC-GOLD PO support at UNFCCC/COP 13 in Bali during the ESA side event and at a display booth

Presentation, publications and outreach

The LC-PO is continuously producing documentations and outreach materials. Several **reports**, **newsletters**, and **scientific papers** have been produced, edited, released and circulated.

The quarterly newsletter is distributed to a comprehensive list of actors involved in global land cover assessment trough GOFC-GOLD and GTOS.

The GOFC-GOLD LC-PO **webpage** contains a variety of services to users including documentation on access to global and regional land cover map products and in-situ observations.

Quarterly Newsletter

Web Page

http://gofc-gold.uni-jena.de

With documentation on global, regional and national land cover data sets

Workshop reports and deliverables have been submitted to ESA. They include status reports, documentation of implementation strategies for harmonization and validation, and results from prototype studies. The LC-PO has contributed to the **GOFC-GOLD report series**, in particular reports summarizing the results of the REDD Workshop in Bolivia. Further input and documentation was provided to UNFCCC COP 12 and GEO. The LC-PO has completed several scientific publications in the peer-reviewed literature.

The PO office contributed to publications reporting on progress in international initiatives, e.g. the GEO publication on "GEO Early achievements" and a GTOS supplement issue on Essential Climate Variables.

GOFC-GOLD Report Series

GOFC-GOLD-31:
Report of the GOFC-GOLD Workshop on the Proposed East Asia Regional Network, 9 June 2006, Ulaanbaatar/Mongolia

GOFC-GOLD-30:
Report of the 2nd GOFC-GOLD Workshop on Reducing Emissions from Deforestation, 17-19 April 2007, Santa Cruz/Bolivia

Workshops and travel

The LC-PO director and officer have organized, contributed and participated in several workshops and meetings to foster international cooperation and communication. Most prominently, the LC-PO has organized a 4-day GOFC-GOLD Workshop in Bolivia on monitoring tropical deforestation and organized side events at UNFCCC SBSTA and COP-13 in Bali (in cooperation with its partners). The PO participated at GLOBCOVER progress meetings and attended international conferences.

Workshops organized by GOFC-GOLD		
Date	**Destination**	**Workshop**
Apr 07	St. Cruz, Bolivia	2nd GOFC-GOLD Workshop of the REDD Working group: From case studies to implementation guidelines
May 07	Bonn, Germany	Joint ESA & GOFC-GOLD side event at UNFCCC SBSTA 26
Nov 07	Boston, USA	Land Cover Implementation Team Meeting
Dec 07	Bali, Indonesia	Joint Winrock International & GOFC-GOLD side event at UNFCCC COP 13: REDD preparedness: a sourcebook for high quality and cost effective estimation
Dec 07	Bali, Indonesia	GOFC-GOLD side event at CIFOR Forest Day
Participation and contribution to Conferences		
Jan 07	Brussels, Belgium	EU Workshop Framework Programme 7
Feb 07	Geneva, Switzerland	GEO User Interface Committee and FCP meetings
Feb 07	Toulouse, France	GLOBCOVER Progress Meeting
Feb 07	Noordwijk, Netherlands	2nd Space & Society Conference "Space Options for the 21st century"
Apr 07	Washington, USA	NASA land cover and land use change science team meeting
Apr 07	Washington, USA	GEO Global Land Cover Task Meeting
Apr 07	Montreux, Switzerland	ESA ENVISAT Symposium
May 07	Munich, Germany	GSE Forest Monitoring validation workshop
Jun 07	Offenbach, Germany	5th German National GCOS Meeting
Jun 07	Basel/Muttenz, Switzerland	Joint Annual Conference of Swiss, German and Austrian Remote Sensing Organizations
Jun 07	Ispra, Italy	1st GlobCover User Consultation Meeting
Sep 07	Frascati, Italy	GlobModel Workshop: "Strenghtening the Use of EO in Earth System Modelling"
Dec 07	Cape Town, South Africa	GEO Ministerial Meeting and Plenary

Financial overview

The GOFC-GOLD LC-PO is operated through ESA's Technical Officer Olivier Arino under ESA ESRIN contract. All expenses have been documented in Quarterly Status Reports and submitted to the ESA technical officer. After successful completion of the first three years, ESA agreed for a contract extension until January 2010.

Financial summary 2007

Revenues:	K €
ESA sponsorship	80.0
Additional funding	6.3
Carry over 2006	8.4
TOTAL	**94.7**
Expenses:	**K €**
Personnel costs	
➢ PO executive officer/staff	53.8
➢ Student support staff	6.8
Travel and subsistence	
➢ PO director and officer	21.2
➢ Workshop subsistence	1.0
Consumables	
➢ Printing/communication cost	2.0
➢ Publications/Brochures/other	0.6
TOTAL	**85.4**
Carry over for 2007*	9.3

* Carry over contains travel support for additional inter-continental missions of PO director and officer in 2008. In addition the LC-PO is receiving less funding support for 2008 and 2009 and the carry over will be used to balance the reduced resources.

Activities and objectives for 2008

Building upon the four successful years of LC-PO operation, the LC-PO will continue to act as focal point for global and regional land cover observations, and as such provide an international interface assisting data producers and land cover mapping programs, and user organizations. Despite progress made, the arena of land cover observations still remains heterogeneous. One of the key general roles of the LC-PO is to coordinate and moderate among the different land cover observation actors. Key activities to achieve progress for **international coordination and cooperation** in particular to evolve common ground for land cover monitoring are:

- Land cover harmonization and assistance for standardized mapping
- Ensure implementation of agreed validation protocols
- Capacity building in particular for developing countries
- Encourage free and open data assimilation and dissemination mechanisms for satellite and in-situ data, and land cover mapping products

Several international activities on the political and strategic level have asked for GOFC-GOLD input to define implementation objectives and priorities. In this context, the LC-PO work plan for the next years includes to foster implementation of the tasks outlined in **Integrated Global Observations for Land** (IGOL), to support the **UNFCCC REDD activities** and **GCOS implementation plan** by evolving standards for essential climate variables in the terrestrial domain and continue to contribute to the GEO process concerning forest and land cover observations.

Following these objectives in 2007, the LC-PO will further contribute to several ongoing land cover mapping projects (e.g. using ENVISAT MERIS data). Most prominently, the LC-PO will further assist ESA in the development of the **GLOBCOVER** products with focus on harmonization, validation and the user assessment. The LC-PO will build up a user interface to establish communication to the users of the products and to receive and assess their feedback. Another main activity will be the issue of tropical deforestation and the **UNFCCC REDD process**. The LC-PO will continue in coordinating the related GOFC-GOLD Working Group, and provide an updated draft of input to the **UNFCCC** to inform policy discussion and foster implementation activities and pilot studies. In the framework of the **GEO** 2007-2009 Working Plan the LC-PO will further its leading role for the global land cover task and be actively involved in forest monitoring activities, as such it will assist in the **FAO-FRA 2010** assist remote sensing component. All these activities will be in accordance and in joint activities with ongoing international developments on the strategic level including cooperation with GTOS, other GOFC-GOLD implementation activities, the GCOS implementation plan, and the UN Global Land Cover Network and user requirements.

Established cooperation and communication with user agencies like FAO, UNEP, the European Environmental Agency (EEA), Canadian Forest Service and considering requirements posed by international conventions and treaties will be strengthened to improve adequacy and advocacy of land cover data sets. Building capacities and confidence will be pursued within GOFC-GOLD (regional networks), the scientific community and with different user organizations. The following workshops and missions will be organized and attended from LC-PO members:

Time	Destination	Purpose and objective
Mar 2008	Rome, Italy	FAO-FRA 2010 global remote sensing survey kick-off meeting
Mar 2008	Rome, Italy	Participation in 2nd GLOBCOVER user consultation
Mar 2008	Bochum, Germany	EaRSEL developing countries special interest group meeting
Apr 2008	Vienna, Austria	Participation in EGU general assembly
May 2008	Vienna, Austria	Participation in Global Land Use data workshop
May 2008	Helsinki, Finnland	GOFC-GOLD Scientific and Technical Board meeting
Jun 2008	Bonn, Germany	Side Event on the REDD sourcebook at the UNFCCC SBSTA 28
Oct 2008	Jena, Germany	2nd GOFC-GOLD land cover symposium and science team meeting
Dec 2008	Poznan, Poland	Participation in UNFCCC COP 14

All progress and developments will be documented and communicated through presentations and reports to ESA, GOFC-GOLD and the public through the LC-PO Newsletter and reports.

More information and contact

More information and documentation about GOFC-GOLD, GTOS, and the LC-PO activities can be found on the following web pages:

ESA:
http://www.esa.int/

ESA Data User Element:
http://dup.esrin.esa.it/

GTOS:
http://www.fao.org/gtos/

GOFC-GOLD:
http://www.fao.org/gtos/gofc-gold/

GOFC-GOLD land cover project office:
http://www.gofc-gold.uni-jena.de/

GOFC-GOLD report series:
http://www.fao.org/gtos/gofc-gold/series.html

Land cover implementation team newsletter (sign up and information):
http://www.gofc-gold.uni-jena.de/sites/letter.html

IGOS-P:
http://ioc.unesco.org/igospartners

CEOS group on calibration and validation for land:
http://landval.gsfc.nasa.gov/LPVS/

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esa GOFC-GOLD GLOBAL OBSERVATION FOR FOREST AND LAND COVER DYNAMICS GTOS