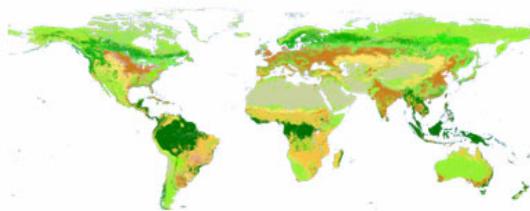


# GOFC-GOLD

GLOBAL OBSERVATION FOR FOREST  
AND LAND COVER DYNAMICS



## GOFC-GOLD Land Cover Project Office

### Annual Report 2004

January 2005



## Overview

Reliable observations of the terrestrial environment 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. There is a strong push from international conventions, treaties, and implementation guidelines like the UN's Conference on Environment and Development (UNCED) Agenda 21, the Kyoto Protocol, the Group of Earth Observations (GEO), the Global Monitoring for Environment and Security (GMES) initiative, and the UN Global Observing Systems implementation activities (GCOS, GTOS, GLCN) for sustained, harmonized, and validated land observation products. With the establishment of the GOF-C-GOLD land cover project office at the FSU Jena, the European Space Agency has taken an action to participate in the strategic development and implementation activities to provide high quality data of the Earth's land surfaces and ongoing change processes.

GOF-C-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.



## The importance of land cover

Land cover is one of the most significant variables in global change and detailed and accurate information is beneficial for a variety of applications:

- Biodiversity conservation and ecosystem health evaluation
- Carbon accounting and sequestration
- Water quality and quantity assessment
- Climate variability investigation
- Hazards vulnerability and disaster management
- Land degradation and food security
- Health and human well-being
- Economic development
- Environmental reporting

*Land cover and the change of land cover affect the services provided to human society (e.g., provision of food, fibre, recreational opportunities, etc.), force climate by modifying water and energy exchanges with the atmosphere, and change greenhouse gas and aerosol sources and sinks.*

(GCOS Implementation Plan, 2004)

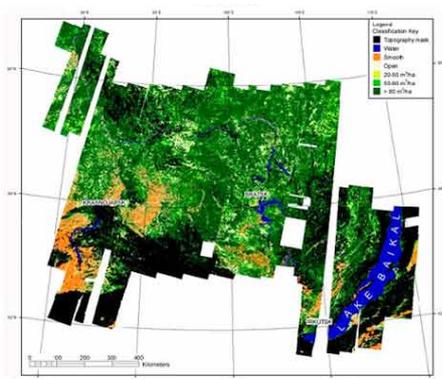
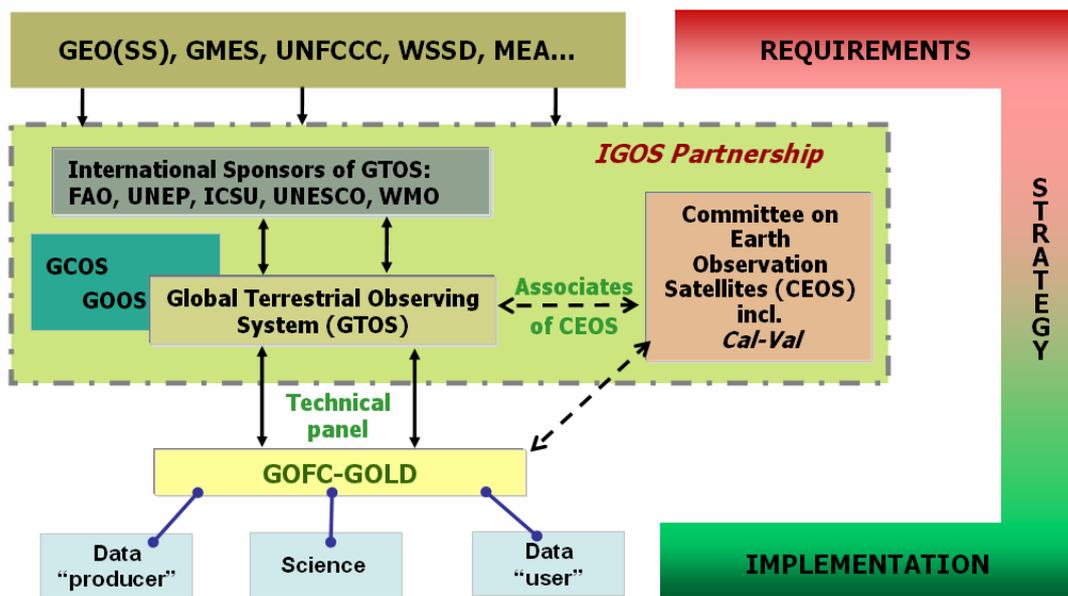


Global land cover products have been produced in different ways. However, they rather exist as independent datasets. Without harmonization, interoperability, and validation some applications are not appropriately served (e.g. land change assessment) and it is currently difficult to provide information for individual users to show which products are best suited to their needs.



# GOFC-GOLD – a platform for international coordination of land observations

Global Observation for Forest and Land Cover Dynamics (GOFC-GOLD) is a coordinated international effort working to provide ongoing space-based and in-situ observations of the land surface. Established as GTOS technical panel, GOFC-GOLD helps to establish the link between space agencies, the science community and the users of Earth Observation data and data products. The primary function of the Land Cover Implementation Team (LC-IT) is to develop and evaluate methods, tools and products for land cover measurements and monitoring using space-borne and in-situ observations. The LC-IT assesses current needs and deficiencies for global and regional monitoring to support Global Change research, national and regional forest and resource inventories and international policy.



Forest Map of Siberia using  
ESA ERS Tandem data  
([www.siberia1.uni-jena.de](http://www.siberia1.uni-jena.de))

The primary GOFC-GOLD objective is to provide continuity and consistency of space-based and in-situ observations of land surfaces:

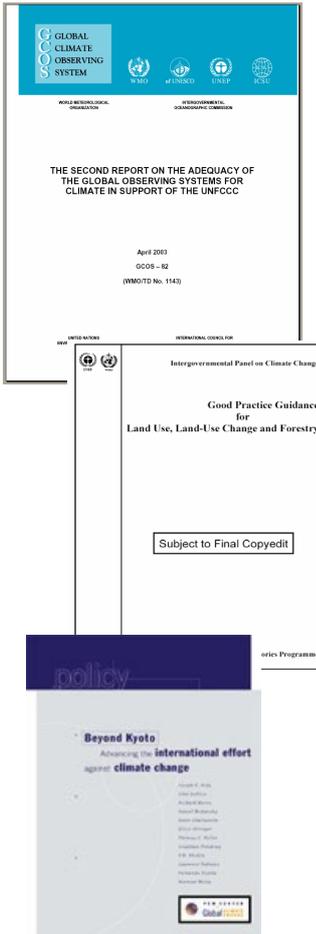
- for sustainable management of terrestrial resources
- to obtain an accurate, reliable, quantitative understanding of the terrestrial carbon budget

GOFC-GOLD land cover implementation priorities:

- Harmonization and validation of land cover products
- Adequacy and advocacy to serve international conventions
- Continued measurements towards operational global land observation
- Analysis and understanding of spatio-temporal land processes

# Requirements and motivation from international conventions and treaties -

## Guidelines for GOCF-GOLD



Earth Observation Summit, Washington, July 31, 2003



**World summit on sustainable development (WSSD), Johannesburg 2002:**  
*Promote development and wider use of earth observation technologies, incl. satellite remote sensing to collect quality data.*

**Group on Earth Observations (GEO), Washington 2003:**  
*Global Earth Observation System of Systems (GEOSS) which should be comprehensive, coordinated, and sustained.*

**Conference of Parties (COP9) - Intergovernmental Panel on Climate Change IPCC:**  
*The data requirements ... be met through approaches that are based on monitoring land-cover change, such as remote sensing.*

**GOCF-GOLD** activities are endorsed and outlined in several international agreements and implementation plans including the GTOS activities and the UN Global Land Cover Network, the GEOSS 10 year implementation plan, and the IGOS-P proposal document on Integrated Global Observations of Land (IGOL). Considering the UNFCCC-GCOS implementation plan, **GOCF-GOLD** is called on to support implementation actions with respect to land cover observations:

- Establish international standards and specifications for the production of land-cover characterization maps
- Produce reliable accepted methods for land-cover map accuracy assessment
- Develop an in situ reference network and apply CEOS WGCV validation protocols for land cover.
- Generate annual products documenting global land-cover characteristics at resolutions between 250m and 1km, according to internationally-agreed standards and accompanied by statistical descriptions of the maps accuracies.

# Making global land observations operational and useful to multifaceted applications -

## The GOFC-GOLD approach ...

### 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

### The 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 a suite of 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

## International partnership of data producers, the science community, and users:



seit 1558

## European Space Agency Sponsorship

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 €240 K over a 3 year (2004-2006) 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 his 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 David Skole from the Michigan State 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 John Townshend and Alan Belward, as well as, the GOFC-GOLD executive office in Edmonton, Canada led by Michael Brady. Specific objectives of the LC-PO are:

1. To establish a GOFC-GOLD LC-PO at the Jena University including the necessary infrastructure required to operate the LC PO.
2. To staff and operate the GOFC-GOLD LC-PO for a period of three consecutive years starting February 2004.
3. Foster the implementation of GOFC-GOLD objectives.
4. 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).
5. To provide ESA with appropriate progress and annual reports and attend regular review meetings at ESA ESRIN, Italy.



## Key activities and achievements 2004

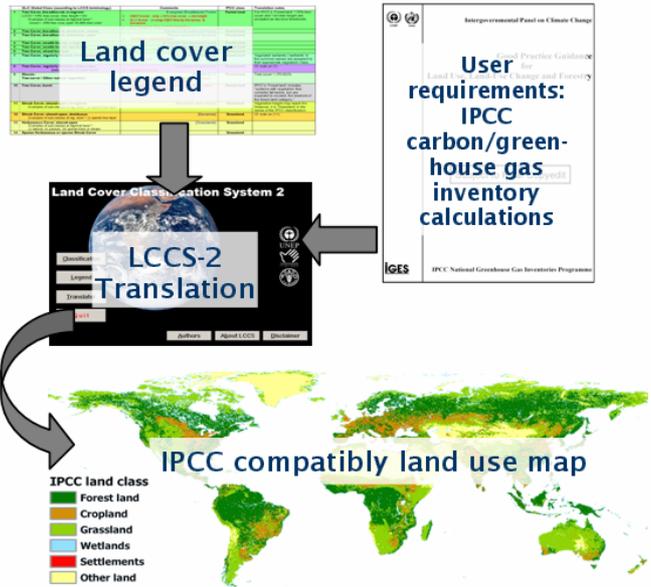
- **Establishment of Land Cover Project Office (LC-PO)**
  - Installation of LC-PO at Friedrich Schiller University Jena
  - Inauguration meeting with press event
  - Dissemination of PO-installation to international programmes and bodies
- **State of the art in global land cover assessment**
  - Collect and summarize published materials
  - Develop documentation on land cover algorithms, change routines, data and data products, in situ facilities etc.
- **Strategies for land cover harmonization and dataset interoperability**
  - Review of previous land cover harmonization approaches
  - Translation and comparison of several land cover legends using the FAO Land Cover Classification System, i.e. IGBP, USGS, CORINE, MODIS Land Cover and Continuous Fields Products and others
  - Development of strategic documents for harmonization of existing land cover datasets and guidelines for standardized development of land cover legends for future mapping activities
  - Assist ESA to harmonize development of the GLOBCOVER products
- **Global land cover validation strategy**
  - Strong cooperation with CEOS Cal-Val group on development of validation standards ('CEOS Cal-Val best practice document')
  - Participation in ongoing validation activities (GLC2000, GLOBCOVER)
  - Outline implementation plan for an operational validation strategy to assess the accuracy of existing and future global land cover products and foster their interoperability and synergy
- **Prototype studies on harmonization and validation**
  - Evaluation and test beds for harmonization and validation strategies
  - Case studies on land cover comparisons are being carried out in Thuringia, Eastern Europe, Siberia, Mongolia
- **GOFC-GOLD science meetings and capacity building**
  - Organization and hosting of the GOFC-GOLD land cover science team meeting in Jena, March 2004
  - Organization and co-hosting of the GOFC-GOLD workshop on harmonization of land cover datasets at FAO in Rome
  - Organization of several small harmonization and LCCS-capacity building events
- **Participation in key events to foster international cooperation**
  - Contacts and communications with GOFC-GOLD regional networks
  - Participation in meetings and workshops on: GLOBCOVER meetings, GTOS, IGOS-IGOL, GLC2000 validation, UN Global Land Cover Network (GLCN), GEOLAND, German Aerospace Center DLR
  - Participation in scientific conferences: ENVISAT Symposium, Lucc symposia
- **Documentation, publication, and outreach:**
  - 25 deliverables submitted to ESA
  - Establishment of webpage and regular updates
  - Development and distribution of four GOFC-GOLD newsletters and contribution to Lucc newsletter
  - Several reports on PO-organized meetings (Jena and Rome)
  - Press releases
  - Assistance and review of key documents: GTOS-Coastal implementation plan, GLOBCARBON product validation plan, CEOS Cal-Val 'best practice' document on validation of global land cover datasets, Integrated Global Observations of Land (IGOL) documents, GEOSS 10 yr. implementation plan, LCCS web-based resources



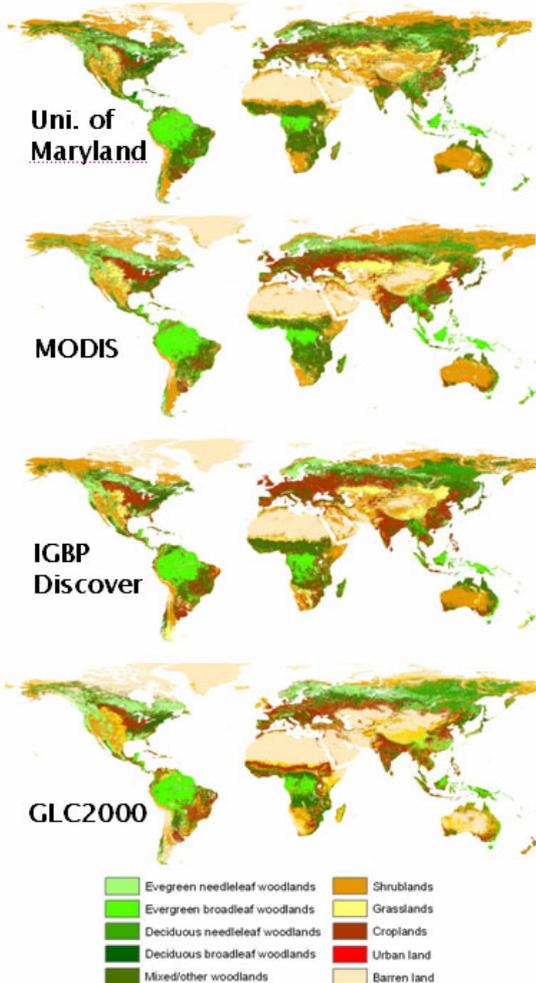
# Harmonization of land cover datasets

Several land cover datasets have been derived in response to the need for detailed and accurate information about land cover and land cover dynamics. Their development was driven by different national or international initiatives and mapping standards that reflect the interests, requirements and methodology of the originating programmes. There is only limited compatibility and comparability between these different maps and their thematic legends. This hinders their flexibility and usability especially considering the original purpose of these datasets to serve a large number of applications including the analysis of land changes.

**GCOS Implementation Plan 2004:**  
*... full benefit should be taken of existing initiatives, e.g., the FAO's Land Cover Classification System for legend harmonization and translation and the legends published by the IGBP and GTOS GOCF-GOLD.*



## Four global land cover datasets – one legend?



## GOCF-GOLD harmonization strategy:

- Land cover legends have to be developed and translated using a common classification system with an accepted land cover language;
- GOCF-GOLD and GTOS recommends LCCS to space agencies and other actors involved in land cover mapping as a standard for land cover legend generation, translation and as exploratory tool for comparing and contrasting different legends;
- known problems in existing legends including semantic gaps, overlaps, unclear class definitions, improper use of mixed units and other inconsistencies should be avoided in the legend development process;
- the development of new legends should adopt or acknowledge previous experiences, requirements, or traditions in land categorization, i.e. class hierarchies, classifier thresholds, or any existing land cover legends;
- true harmonization has its most impact in the development phase of land cover datasets. Thus harmonization efforts have to impact operational land cover data collection;
- there can be tradeoffs between the quality of dataset, the requirements of specific applications, and the level of standardization.

# GOFC-GOLD international validation initiative



Global land cover datasets validation is a challenging effort due to the high frequency of mixed pixels, difficulty in precise geo-location of map products and reference materials, and logistical difficulties associated with reference data collection. The general approach is to combine experiences and resources from all actors involved in global earth observations of land including space agencies such as the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA), the Food and Agricultural Organization (FAO) with GTOS and the Global Land Cover Network (GLCN), the Committee Earth Observation Satellites (CEOS) with the group on calibration and

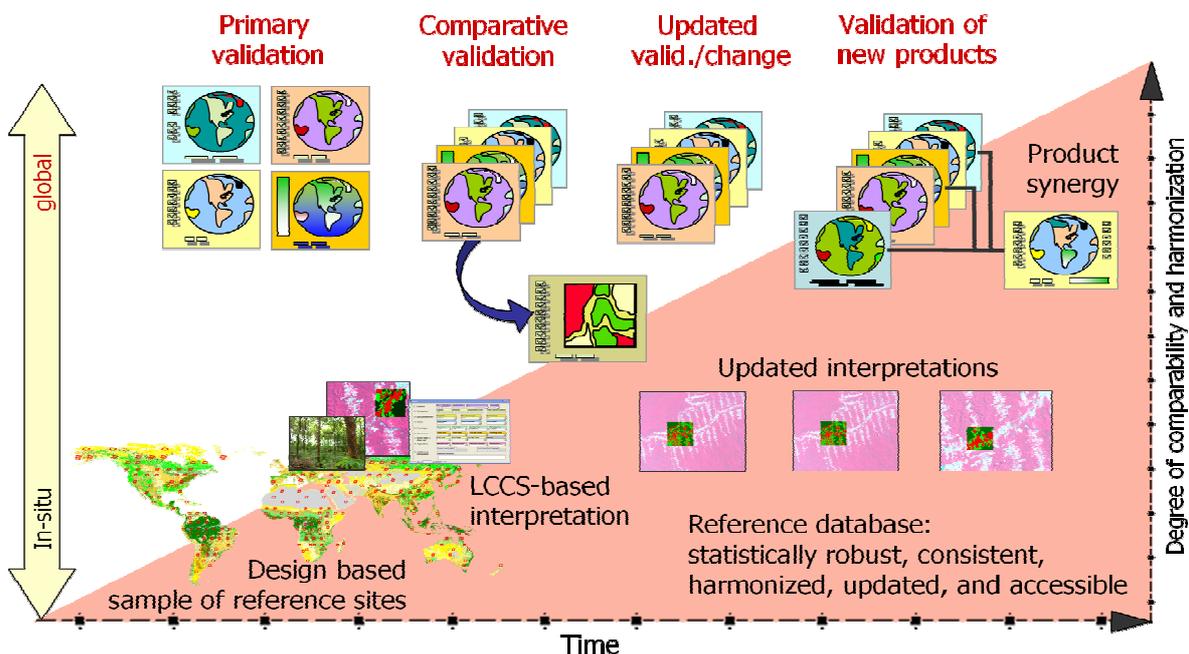
validation (Cal/Val) and the Joint Research Center (JRC). All of these organizations as well as the users will profit from such a combined effort. The initiative is coordinated by GOFC-GOLD and the CEOS Cal-Val group with regional networks playing an important role in the in-situ data acquisition.

## Why validate land cover products?

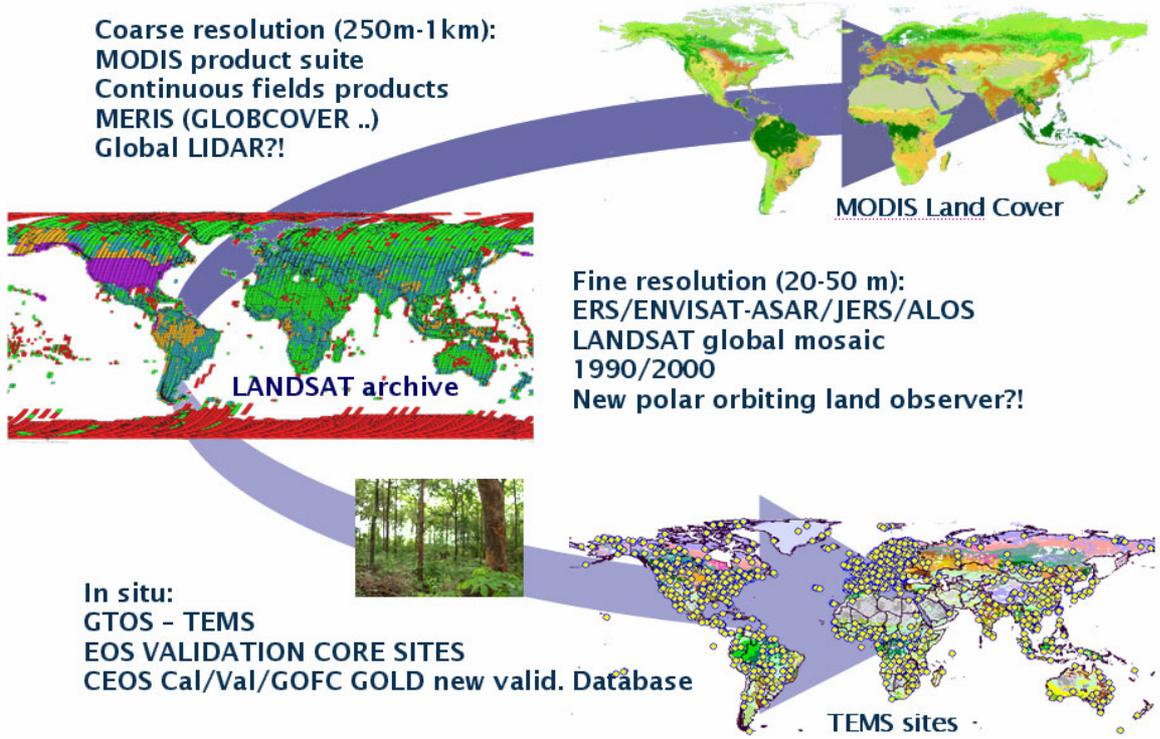
- Validation is important both during the production and after the completion of land cover maps
- Good science and resource management require understanding of product accuracy/uncertainty
- Explicit statements of uncertainty fosters an informed user community and improved use of data
- International environmental protocols and agreements imply products may be independently evaluated and possibly challenged
- Successful interoperability requires robust validation

A new set of validation samples is needed to provide a statistically robust, consistent, harmonized, updated, and accessible reference database. The intent is to select the sites in such a way that they are not associated with any specific land cover map and that they may retain statistical rigor when used on a variety of maps. The database will be maintained as "living" dataset of validation sites that could be used to verify any existing and new land cover map including GLOBCOVER. Such a dataset will allow continued assessment of the accuracy and validity of datasets and associated changes even after many years of their production. The validation will be based on high-resolution satellite data. Continued observations on this scale are essential to maintain the keep the reference database "living" and up to date.

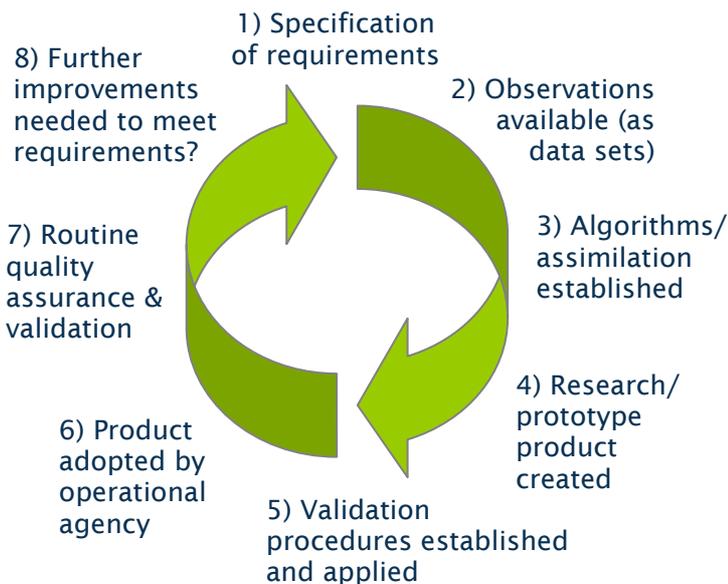
## Harmonization and Validation Framework



# Towards operational terrestrial observations

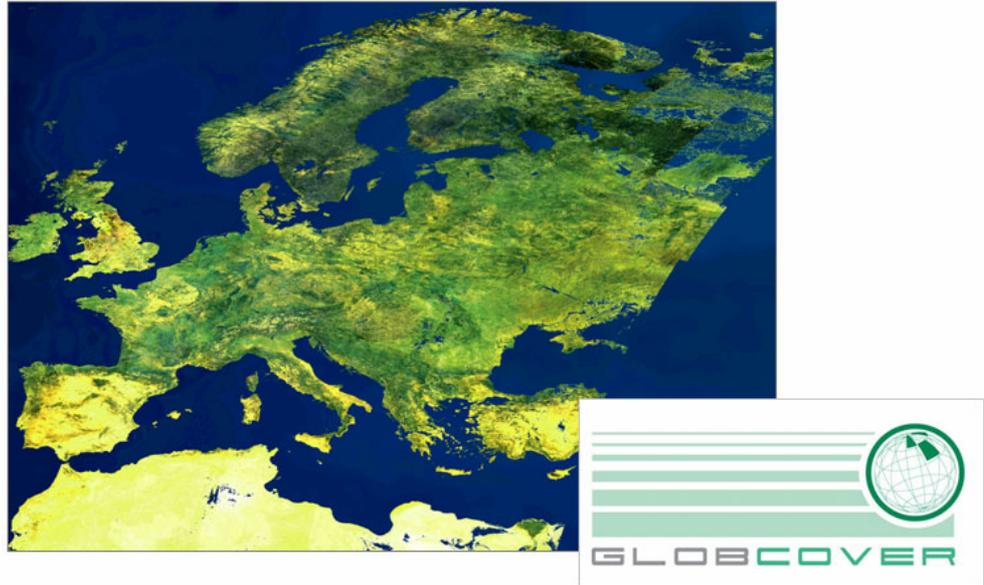


## GOFC-GOLD concept for operationalizing products



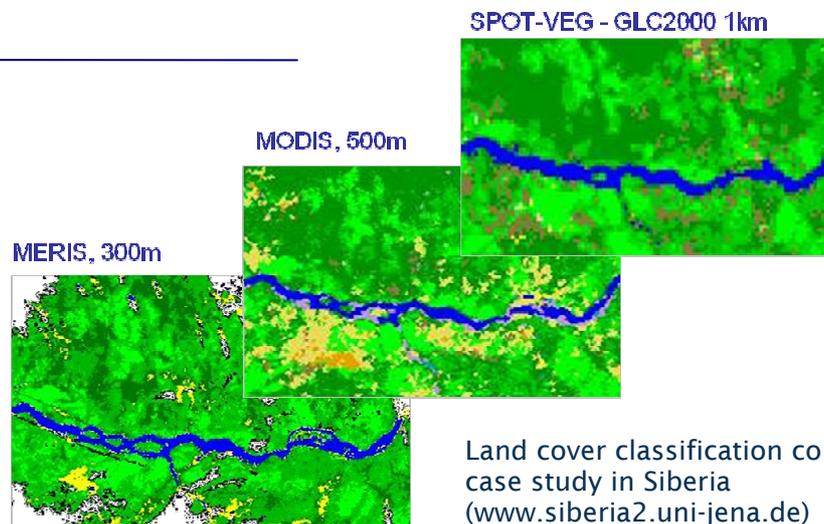
GOFC GOLD works towards operational observations land. Keys are continuity and consistency in observations within an integrated framework combining in situ measurements, fine and coarse resolution satellite data. These efforts go along with the outline for operationalizing land cover observation and end to end international coordination: 'from observation to use' and integration of satellite and in situ observations: 'from global to local'. The implementation is ensured through GOFC GOLD contributions in two new activities: The development of the new IGOS theme Integrated Global Observations of Land (IGOL), and the UN Global Land Cover Network (GLCN).

## Support of ESA land cover mapping initiatives



The GLOBCOVER project was launched 2004 as an initiative of ESA which is led by an international network of partners, in particular ESA, FAO, UNEP, JRC, IGBP and GOFC-GOLD. The objective of GLOBCOVER is to produce a global land-cover map for the year 2005, using fine resolution (300 m) ENVISAT-MERIS data to be acquired over the full year 2005. 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 (GLC 2000) with a resolution of 1 km.

The GOFC-GOLD LC-PO will play an active role in the coordination and development of the GLOBCOVER products. GLOBCOVER provides an opportunity to implement the GOFC-GOLD objectives for harmonized and validated land cover mapping. The LC-PO will assist ESA for a standardized and flexible definition of the land cover legends and the accuracy assessment of the land cover products.



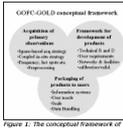
Land cover classification comparison for case study in Siberia  
([www.siberia2.uni-jena.de](http://www.siberia2.uni-jena.de))

# Presentation and outreach

The LC-PO produces and contributes to a variety of documentations and outreach materials. A variety of web-based materials, newsletters and press releases have been produced and edited as part of the PO activities. The quarterly newsletter is distributed to a comprehensive list of actors involved in global land cover assessment through GOCF-GOLD and GTOS. The GOCF-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. About one Gigabyte of documentation materials have been downloaded from this webpage in 2004.



**Global Observation for Forest and Land Cover Dynamics** is a coordinated international effort working to provide ongoing space-based and in-situ observations of forests and other land vegetation cover types, for the sustainable management of terrestrial resources and to obtain an accurate, reliable, quantitative understanding of the terrestrial carbon budget. Originally developed as a pilot project by the Committee on Earth Observation Satellites (CEOS) as part of their Integrated Global Observing Strategy, GOCF-GOLD is now a panel of the Global Terrestrial Observing System (GTOS). The general framework is summarized and further refined in Figure 1.



The main objective of the new project is to review the progress of the implementation of the new Land Cover Product (LCP) and to develop a future prospectus for the new Land Cover Product (LCP) and to develop a future prospectus for the new Land Cover Product (LCP).



The ESA GOCF-GOLD Project Office organized jointly with FAO's GTOS secretariat a workshop on harmonization of land cover products. The workshop was held 14<sup>th</sup>-16<sup>th</sup> of July 2004 at FAO in Rome. This meeting was fostered by the growing need for detailed and accurate information about land cover and land cover change on different geographic scales. A variety of regional and global land cover products exist, i.e. IS9P Discovery, MODIS Land Cover Product, GLC 2000, CLC1990 and 2000 etc.). There is, however, no common language between these different maps and their thematic legends (Fig. 1). This hinders a joint application, in particular for analysis of changes, comparisons between the maps and complicates coordinated efforts in their validation.

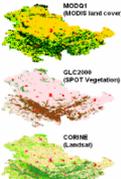


Fig. 1 Three land cover products (MODIS, GLC2000, CORINE) for the area of Europe (Germany). They are based on different approaches and varying standards for definition of land cover categories. Harmonization seeks for compatibility and comparability between them.

The topics of the workshop have been outlined in the previous GOCF-GOLD workshop held in Jena, Germany in March 2004, where GOCF-GOLD, ESA, and GTOS (with the Food and Agriculture Organization of the United Nations (FAO)) have agreed to jointly foster the harmonization and validation of global land cover products. The workshop brought together key participants essential for a successful implementation of harmonization efforts. Participants include GOCF-GOLD LC-IT members, representatives from FAO and GTOS, ESA, CEOS, IS9P and UNEP, JRC, DLR, research universities focused on land cover mapping (i.e. Boston University, Uni. of Maryland),

**CONTENTS:**

- GOCF-GOLD/FAO workshop on harmonization of land cover products
- The FAO Land Cover Classification System 3
- Miscellaneous 4



The meeting was attended by participants: members from GOCF-GOLD LC-IT, representatives from several national and international organizations (e.g. from FAO, GTOS, CEOS), space agencies (ESA, DLR, CNES, JAXA), members of the scientific community and companies.

Global and regional land cover maps derived from remotely-sensed data have limitations in the accuracies they can achieve. Validation is important both during the production and after the completion of land cover maps. Understanding and explicit statements of the land cover product accuracy fosters an informed user community, forms the base for good science, interoperability, and resource management. International environmental protocols and agreements imply that land cover products may be independently evaluated and possibly challenged. Ultimately, validation will improve the value of these land cover datasets for a multitude of applications and contributes towards operational terrestrial observations of the land surface.

Global and regional land cover datasets is not satisfying. Validation exercises have been completed to varying degrees for individual land cover datasets. The only global land cover dataset, the IS9P Discovery, however, are the only global land cover products that can be considered thoroughly validated. Other efforts have suffered from limited resources. This includes the lack of funding, the availability of reference data and validation standards, and insufficient international cooperation and coordination. With GOCF-GOLD involvement, recent progress has been made to approach these deficiencies.

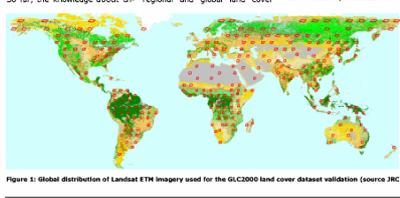
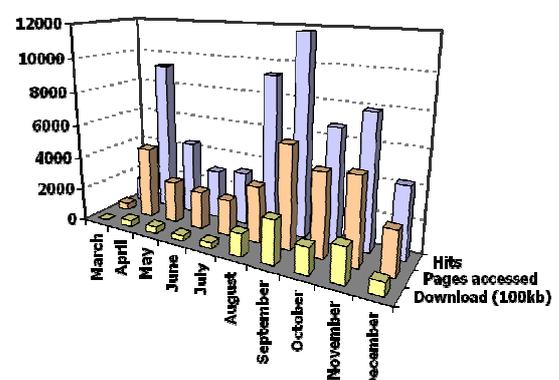


Figure 2: Global distribution of Landsat TM imagery used for the GLC2000 land cover dataset validation (source: JRC).

**Web page with data access documentation:**  
[www.gocf-gold.uni-jena.de](http://www.gocf-gold.uni-jena.de)

**Web-Statistic 2004 (March-Dec.):**

- Total hits: 62.000
- Document-Downloads: 1 GB



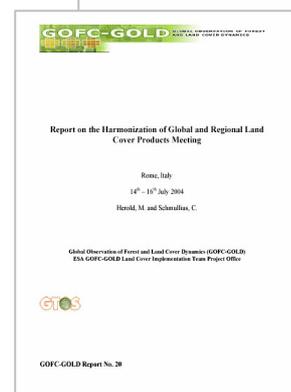
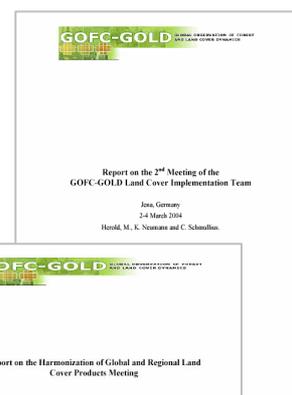
## Publications, reporting and workshops

Deliverables to ESA and GOFC-GOLD, scientific publishing and presentation, and workshops and meetings have been prepared in 2004. The GOFC-GOLD report series now contains 20 reports (access: <http://www.fao.org/gtos/gofc-gold/series.html>). In 2004, the LC-PO produced two GOFC-GOLD reports as part of this series:

- GOLD-18: Land Cover Implementation Team Meeting, Jena, Germany, 2-4 March 2004, prepared by M. Herold, K. Neumann and C. Schmullius,
- GOLD-20: Report on the Harmonization of Global and Regional Land Cover Products, Workshop report at FAO, Rome, Italy, 14-16 July 2004, prepared by M. Herold and C. Schmullius,

The PO regularly reports to ESA through a series of deliverables.

<i>PO deliverable document</i>	<i>Submitted to ESA</i>
User Info Service incl. Overview of Funding Opportunities	31 Jan 04
User Info Service incl. Overview of Funding Opportunities	30 Apr 04
Prototype studies criteria catalogue	31 Mar 04
Quarterly Status Report	15 Apr 04
User Info Service incl. Overview of Funding Opportunities	30 Apr 04
Data Access Proposal 1	31 May 04
Specification of land cover requirements base on existing documents in cooperation with international agencies on standards	30 Jun 04
Analysis of historical land-use data sets	30 Jun 04
Overview of available EO sensors	30 Jun 04
Overview of available land cover validation sites	30 Jun 04
Implementation Strategy 1	30 Jun 04
Quarterly Status Report	15 Jul 04
User Info Service incl. Overview of Funding Opportunities	30 Jul 04
Prototype studies status	30 Sep 04
Quarterly Status Report	15 Oct 04
User Info Service incl. Overview of Funding Opportunities	30 Oct 04
Documentation on land cover algorithms	31 Dec 04
Documentation on land cover change routines	31 Dec 04
EO Mission Requirements	31 Dec 04
Validation strategy 1	31 Dec 04
Implementation strategy 2	31 Dec 04



**Workshops and meetings to foster international cooperation and communication**



**Harmonization workshop at FAO Rome, July 2004**

**PO inauguration and land cover science team meeting Jena, March 2004**

Last row from left: R. Rezel, H. Geist, S. Baralev, J. Laflam, A. Rosanglyet, C. Woodcock, H. Jeangjean, S. Flummer, T. Hoeseler  
Center row from left: M. Schirnik, A. Belward, C. Gid, H. Brady, J. Townsend, D. Skole, O. Krankina, H. Bakter  
Front row from left: A. Di Gregorio, M. Mahmud, M. Larsen, C. Schmullius, O. Gerstenson, M. Herold

## Financial summary 2004

The GOFC-GOLD LC-PO is operated through ESA's Technical Officer Olivier Arino under ESA ESRIN contract: 17970/04/1 IW. All invoices to ESA were issued and paid according to that contract. All expenses have been documented in Quarterly Status Reports submitted to the ESA technical officer. The operation of the PO started in Feb. 2004. The financial summary contains cost statements from Feb-Dec 2004 and estimates for Jan 2005.

Missions completed by PO office director and executive officer in 2004:

Date	Destination	Mission
Feb 04	Berlin, Germany	Participation and representation in GEOLAND meeting
Mar 04	Jena, Germany	Participation in GOFC-GOLD PO inauguration event
Apr 04	Frascati, Italy	Contribution to GLOBCOVER meeting at ESA
July 04	Rome, Italy	Preparation and hosting of land cover harmonization workshop at FAO
Aug 04	Copenhagen Denmark	Participation and representation at LUCC carbon workshop
Sept 04	Salzburg, Austria	Participation and representation in ESA - ENVISAT/ERS Symposium
Sept 04	Florence, Italy	Implementation meeting of IAO/USAID/FAO/UNEP experts on land cover mapping and change assessment
Sept 04	Rome, Italy	Contribution to IGOL preparation meeting at GTOS/FAO
Oct 2004	Amsterdam, Netherlands	Participation and representation at LUCC land use workshop
Oct 2004	Bonn, Germany	Project meeting with German Space Agency on GEO and land cover strategies at DLR
Oct 2004	Ispra, Italy	Participation and contribution to GLC2000 validation workshop at JRC

### Financial overview

Incoming:	K€
ESA sponsorship	80.0
Additional workshop funding from FAO-GTOS, NASA-START and Canadian Forest Service	10.8
<b>TOTAL</b>	<b>90.8</b>

Outgoing:	K€
Salaries (including overheads)	
➤ PO executive officer	42.5
➤ Student support staff	10.4
Travel and subsistence	
➤ PO director and officer	8.5
➤ Workshops (paid by additional funding)	10.8
Consumables	
➤ Printing/communication cost	1.7
➤ Publications/Brochures	0.4
➤ Literature	0.5

<b>TOTAL</b>	<b>74.8</b>
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<b>Carry over for 2005*</b>	<b>16.0</b>
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\*PO budget was estimated for three years overall support of 240K€. Carry over amount contains travel support for additional inter-continental missions of PO director and officer in 2005, and increasing amounts of publications, printing, outreach, and capacity building costs for full implementation of strategies in the second and third year of operation.

## The GOFC-GOLD PO in 2005

In 2005 the LC-PO will continue to work on the implementation of the GOFC-GOLD objectives. Main issue for 2005 is the active harmonization and exploration of synergies between existing global and regional land cover products. All activities will be in accordance and in cooperation with ongoing international developments on the strategic level including GEO(SS), GMES, IGOS-P/IGOL, the GTOS GOFC-GOLD implementation activities, the GCOS implementation plan, and the UN Global Land Cover Network and the user requirements.

The LC-PO will contribute to several ongoing land cover mapping projects (e.g. using ENVISAT MERIS data). Most prominently, the LC-PO will assist ESA in the development of the GLOBCOVER products with focus on standardized and flexible land cover legend development and validation activities. The international initiative on harmonization and validation of existing and future global land cover datasets will be refined and taken from the strategic level to implementation activity. Funding strategies will be elaborated under consultancy of ESA. The LC-PO will continue evaluating harmonization and validation strategies in specific case studies. The objective is to provide the user community with comprehensive and flexible land cover information based on the current status of map products.

A main component of the activities is communication with users and evaluation of user requirements with respect to land cover. 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.

More specifically, the following workshops and missions will be organized, supported and attended from LC-PO members:

Time	Destination	Purpose and objective
Feb 2005	Ispra, Italy	Harmonization and validation of land cover datasets at JRC
March 2005	Phoenix, USA Los Angeles, USA	GOFC-GOLD special session on global urban observations at URS2005; validation meetings at NASA JPL
April 2005	Beijing, China	GOFC-GOLD Scientific and Technical Board Meeting on implementation strategies and regional networks
May 2005	South Dakota, USA	GOFC-GOLD workshop on validation of land cover continuous field products at USGS
June 2005	St. Petersburg, Russia	GOFC-GOLD / NERIN regional network workshop at ISPRS conference
Oct 2005	Bonn, Germany	GOFC-GOLD panel at LUCC - 6th Open Meeting

Further activities include GOFC-GOLD regional capacity building workshops and GOFC-GOLD land cover implementation team meetings. 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 that are published on the GOFC-GOLD LC-PO webpage.

## More information and contacts

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

**ESA:**

<http://www.esa.int/>

**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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