GOFC-GOLD Canada Friedrich-Schiller-Universität Jena esa

LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

JULY 2007 NUMBER 15

Content

UPCOMING SYMPOSIA & EVENTS

GOFC-GOLD is pleased to announce two upcoming events: The **GOFC-GOLD Africa Symposia**, to be held 12-16 November 2007, in Accra (Ghana), includes the West-Africa regional network meeting and a fire danger requirements workshop. The meeting is held in conjunction with GEO.

From 22-25 October 2007 the next **GOFC-GOLD Land Cover Team Meeting** will be held at Boston University, USA.

ESSENTIAL CLIMATE VARIABLES FOR MONITORING THE CLIMATE SYSTEM

GTOS & GOFC-GOLD DRAFT UNFCCC STANDARDS FOR REPORTING ON LAND COVER

The Implementation Plan of the Global Climate Observing System (GCOS IP) to the UNFCCC identifies 34 Essentials Climate Variables (ECV's) within the three domains: ocean, atmosphere and land. They are of key importance for understanding and monitoring the global climate system. To ensure a consistent global monitoring framework of these variables, the GCOS IP specifies actions, requirements and underlines the importance of space-based earth observations.

"Land cover" is one of the terrestrial ECV's. It is defined as the observed physical cover including the vegetation (natural or planted) and human constructions that cover the earth's surface (FAO). Land cover and the climate system are closely linked. The land surface interacts with the atmosphere and regulates the hydrological cycle and the earth's energy budget. Land cover is an important component in the global carbon cycle as different types of land cover act as a source or a sink of carbon (fig. 1). The regular monitoring and assessment of land cover change is therefore essential to understand the extent and impact of natural and anthropogenic changes (http://www.fao.org/gtos/ECV-T09.html).

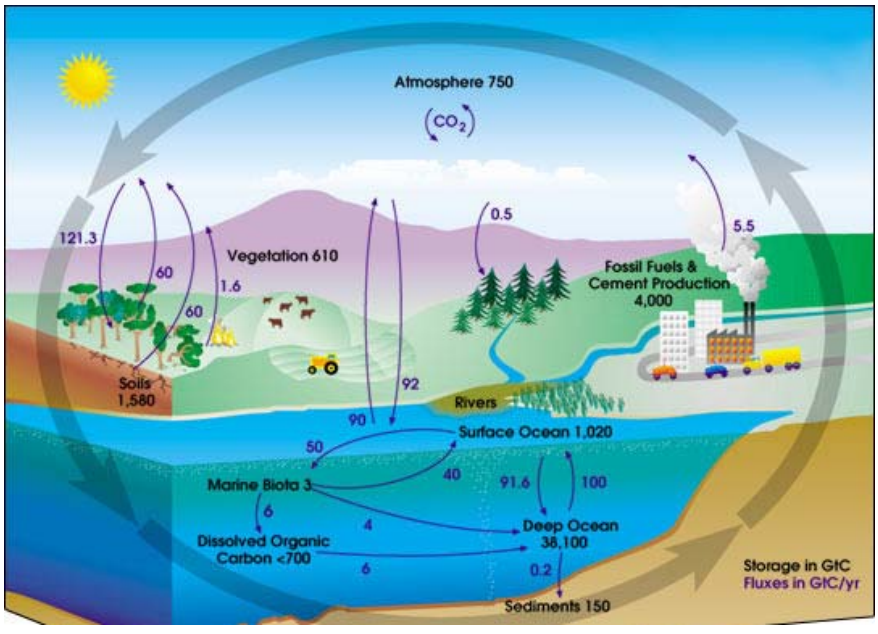


Fig. 1: The global carbon cycle (source: NASA)

The Global Terrestrial Observing System (GTOS) develops a framework to prepare standards and reporting guidelines for all terrestrial ECV's. The 23rd UNFCCC SBSTA (Nov. 2005, Montreal) asked GTOS to assess and report on this development process. In response to that request, GTOS has prepared an assessment report and will present it to the UNFCCC at the upcoming 13th COP in November.

The first version of the Land Cover ECV analysis report is available on the GTOS terrestrial ECV website: http://www.fao.org-/gtos/topcECV.html.

It summarizes available classification systems and harmonization efforts, as well as existing in-situ and satellite measurement methods and standards. Furthermore, it reports on ongoing remote sensing activities, available sensors and validation initiatives. GOFC-GOLD is invited to provide feedback and help to develop the current draft for land cover. The GOFC-GOLD Land Cover Implementation Team is in the process of preparing a consensus update to be discussed at the LC-IT Meeting, in October 2007, in Boston.

Domain	Essential Climate Variables	
Atmospheric (over land, sea and ice)	**Surface:**	Air temperature, Precipitation, Air pressure, Surface radiation budget, Wind speed and direction, Water vapour.
	Upper-air:	Earth radiation budget (including solar irradiance), Upper-air temperature (including MSU radiances), Wind speed and direction, Water vapour, Cloud properties.
	Composition:	Carbon dioxide, Methane, Ozone, Other long-lived greenhouse gases[12], Aerosol properties.
Oceanic	**Surface:**	Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Current, Ocean colour (for biological activity), Carbon dioxide partial pressure.
	Sub-surface:	Temperature, Salinity, Current, Nutrients, Carbon, Ocean tracers, Phytoplankton.
Terrestrial[13]	River discharge, Water use, Ground water, Lake levels, Snow cover, Glaciers and ice caps, Permafrost and seasonally-frozen ground, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (fAPAR), Leaf area index (LAI), Biomass, Fire disturbance.	

Tab.: UNFCCC Essential Climate Variables (ECV)

Further information:
GTOS: http://www.fao.org/gtos/topcECV.html
UNFCCC: http://unfccc.int/methods_and_science/research_and-_systematic_observation/items/3462.php

GLOBAL LAND COVER TASK APPROVED AS GEO EARLY ACHIEVEMENT

The GOFC-GOLD Land Cover Team is engaged in a number of GEO tasks. The recent efforts and major achievements concerning Global Land Cover have been submitted to GEO and the "Improved global land cover observations and assessments" are approved as **GEO Early Achievements** and will be presented at the GEO Plenary Meeting, in November 2007. The box below summarizes the highlights.

Recent Global Land Cover Efforts in brief

Integrated Global Observations for Land (IGOL)
Completion & presentation of the IGOL document to the IGOS-P Plenary as first comprehensive and integrated observation strategy for the land domain
http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=709

Release of ESA's GLOBCOVER product based on 2005/06 ENVISAT MERIS data as highest resolution (300 m) consistent global land cover map fully compliant with international standards for land cover characterization (LCCS) and validation (CEOS best practices).
http://www.esa.int/due/ionia/globcover/

Mid-decadal and decadal global land cover datasets: NASA and the U.S. Geological Survey made progress acquiring high resolution imagery for the Mid-decadal Global Land Survey that will provide a consistent, preprocessed, global, free-of charge Landsat data for 2005 that extends the 1990 and 2000 Geocover Landsat global dataset.
http://mdgls.umd.edu

GEO global land cover dataset: the international community has produced a first "best available" global land cover dataset that could evolve to a "GEO global land cover product". Starting with existing moderate resolution global land cover datasets, the community harmonizes existing data to derive the best land cover estimate for each location worldwide.

INTEGRATED GLOBAL LAND OBSERVATION

STRATEGIC DOCUMENT FOR IGOL SUCCESSFULLY PRESENTED TO IGOS

Background

The facilitation of "Integrated Global Observation of Land" (**IGOL**) is the goal of the thematic focus of the Integrated Global Observing Strategy (**IGOS**). The IGOS partnership was established in 1998 and aims to provide a comprehensive framework to harmonize the common interests of the major space-based and in-situ systems for global earth observation.

IGOS is not an institutional organization but an international framework of cooperating partner organizations. The vision is that a common strategy of different actors will increase scientific understanding, help the development of early warning systems and guide policy-making for sustainable development (http://www.eohandbook.com/igosp/).

The Land Theme: IGOL

The IGOS partnership is organized in several themes focusing on different observation areas (e.g. atmosphere, geohazards and coastal zones). In 2003, a Land Theme was proposed to consider the specific observational needs relating to land aspects, such as sustainable economic development, natural resources management, conservation and biodiversity. Land observations are currently not well coordinated in many areas, which is a particular challenge for the Theme team.

The recently completed and presented IGOL-documentation is the result of the Land Theme development. The GOFC-GOLD LC-IT together with other partners was involved in its preparation. It provides a detailed analysis concerning observation needs, technical requirements, the current status of observations and future plans for a wide range of terrestrial classes (see box). Based on the analysis of existing gaps and necessary enhancements, it formulates recommendations for further actions. Recently, the IGOL document was presented and approved at the 14th Plenary Meeting of the IGOS Partnership, the 30th May in Paris. It is available online on the meetings website: http://www.ioc-goos.org/IGOS-P-14 (Agenda item 4.2)

Main classes of observations recognized in IGOL:

- Land cover
- Land use
- Biophysical properties relating to ecosystem dynamics
- Biodiversity
- Agriculture
- Forestry
- Soils
- Human Settlements and Socio-Economic Data
- Water Availability and Use

Transition into GEO

In the future, the IGOS partnership is to be integrated into the GEO process. All IGOS Themes are asked to propose transition arrangements. John Townshend, from the GOFC-GOLD Land Cover Implementation Team (LC-IT) coordinates this transition process for the Land Theme. The various IGOL recommendations will feed into various GEO tasks and other international coordination mechanisms. The LC-IT will be involved in this process to ensure the proper reflection of all IGOL goals in the future and to avoid any parallel activities. Several of the recommendations of IGOL have already been clearly mapped to GEO tasks and are supportive of GEO's activities (see examples in table). Further details of the transition will be developed in the near future.

Relation of selected IGOL recommendations to GEO tasks

Sub-Theme	Status	Bodies carrying out tasks
Land Cover	Largely transitioned to GEO: DA-07-02 & 03	GOFC-GOLD, FAO/GTOS, CEOS etc
Land Use / Change	LU transitioned to GEO: GEO needs a more comprehensive global LU activity.	GOFC-GOLD and FAO/GTOS
Fire	Partly transitioned to GEO: DI-06-13	GOFC-GOLD and FAO/GTOS
Biodiversity / Conservation	Report submitted to GEO	GEO, CBD, WHC etc.
Agriculture	Transitioned to GEO: AG-07-03	IGOL Agriculture Team with FAO and GEO

QUALITY REVIEW OF THE FIRST GLOBCOVER ENVISAT MERIS BI-MONTHLY MOSAICS

GLOBCOVER USER CONSULTATION MEETING HELD IN ISPRA

In May 2007, the ESA and GLOBCOVER consortium released the first products. The datasets are available for the user community through the new data portal at http://www.esa.int/due/ionia/globcover/. Up to now, the web tool provided access to two global bi-monthly MERIS mosaics for the time periods Mai/June 2005 and March/April 2006.

Overview of the GlobCover products

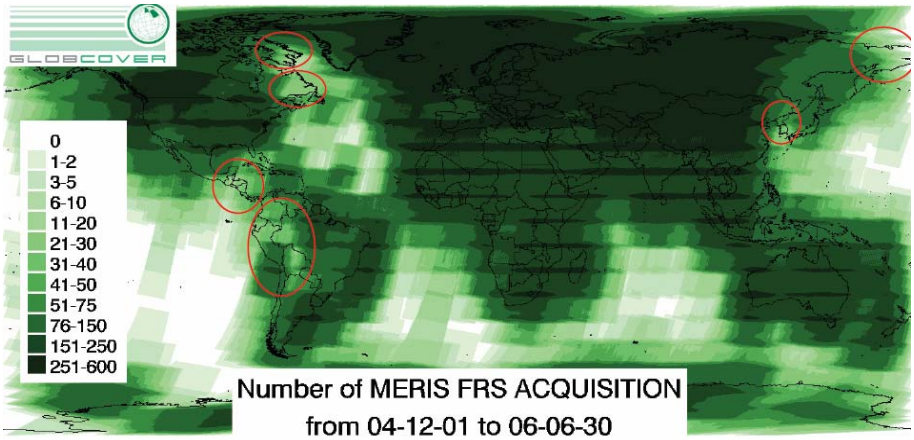
Bimonthly MERIS fine resolution composites
- 6 products per year (every 2 months, averaging surface reflectance calculated from valid observations of the period)

Annual MERIS fine resolution composite
- 1 product per year (averaging the surface reflectance of the bimonthly products of the year)

Land cover map
- 1 product per year (classification of time series of MERIS FR composites)

GLOBCOVER project partners at the first user consultation meeting: Jean-Louis Weber, EEA, presents foreseen use of the products.

Following this successful data release, a first User Consultation Meeting took place at the Joint Research Center (JRC) in Ispra (Italy) on the 20th June 2007 where the project consortium and representatives from users, i.e. the European Environmental Agency (EEA), the United Nations Environment Programme (UNEP) and GOFC-GOLD, reviewed the quality of the global mosaics and discussed foreseen applications. In preparation of the meeting, all users of the web portal had been invited as well to submit their feedback and comments to ESA. All users highlighted the geolocation quality of the new products and its importance for future land cover change studies.



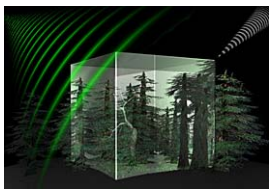
Frequency of MERIS observations between Dec. 2004- June 2006 highlighting some areas we low data density. These areas will be addressed in future MERIS acquisitions plans.

The partners reported on known issues regarding the mosaics quality (e.g. atmospheric effects, problems of snow detection at high latitudes) which have been resolved in the processing chain and will be corrected in the second version of the products. A new issue raised from the user feedback is the coverage of the mosaics. Missing areas were identified in the products e. g. in Central America, Newfoundland and East Siberia, due to a low coverage with valid MERIS images (see fig.). An adjustment of the ENVISAT acquisition plan or the use of other data sources was discussed to solve this issue.

The production of the Version 2 composites has started in July with the global one-year-composite (available in October). The first global non-validated land cover map will be published in September; a validated map will be available in November.

PROPOSED P-BAND SAR SENSOR TO IMPROVE BIOMASS MEASUREMENTS FROM SPACE

ESA BIOMASS MISSION TESTS TECHOLOGY FOR A SPACE-BORNE P-BAND SENSOR

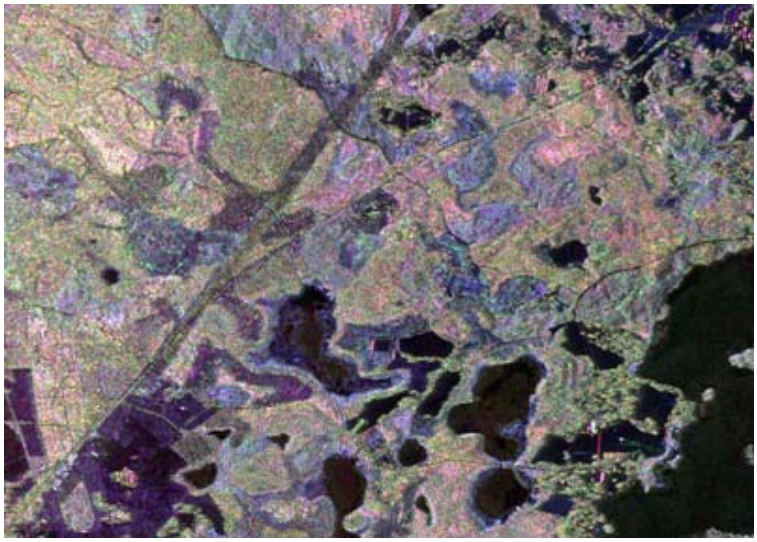


The biomass of the terrestrial ecosystems, especially in forests ecosystems, is an important variable in the global climate system as it directly reflects the carbon stock. The knowledge of the spatial distribution of forest biomass and its temporal changes is therefore important to better estimate actual and future terrestrial carbon cycle. A new biomass sensor was proposed in the frame of the **ESA Earth Explorer Programme**, based on SAR technology. The **BIOMASS mission** together with five others proposals have been accepted in the programme for a future mission and are currently undergoing detailed field studies. At the end of this review process, one mission will be selected and realized.

The BIOMASS mission aims to launch a **space-borne Synthetic Aperture Radar** (SAR) instrument to measure forest biomass globally. The goal is to improve the understanding of forest dynamics, especially over boreal regions. The mission will allow consistent global estimates of forest biomass, disturbance and re-growth.

The Sensor is planned to operate in **P-band**, at 435 MHz. This band was chosen because these relatively long wavelengths are generally much more sensitive to forest cover and biomass as they are able to penetrate the forest crown and interact with vegetation structure. Furthermore, the typical weather independency of radar sensors is especially good at long wavelengths of the P-band and permits to see even through heavy rain showers. The envisaged sensor is planned as a full polarimetric and interferometric instrument. Current available spaceborne SAR systems are not optimal to retrieve biomass information.

In May, a 2-month airborne radar campaign (BioSAR) was completed to test and refine the proposed concept. The field study took place in a test area with boreal forests in Southern Sweden. The DLR E-SAR instrument was used during the campaign. This is an airborne L- and P-band sensor of the German remote sensing agency. Parallel ground measurements of the aboveground biomass, forest height, ground condition were done by Swedish project partners. During the campaign L- and P-band in multi-polarization have been used to compare and evaluate both systems (source: ESA).



Example of a P-band SAR image recorded by the DLR airborne instrument E-SAR. The color composite is composed of the different sensors polarizations. Colors and textures reflect different forest characteristics (source: ESA).

Further information:
http://www.esa.int/esaLP/SEMFCJ9RR1F_index_0.html

ERS 2	RADARSAT 1	ENVISAT / ASAR	ALOS / PALSAR	TERRASAR-X
C-band	C-band	C-band	L-band	X-band
1995, ESA	1995, Canada	2002, ESA	2006, JAXA	2007, Germany

Available space-borne SAR sensors

GOFC-GOLD ORGANIZES PAN AFRICAN SYMPOSIUM

GOFC-GOLD WILL DEVELOP A WEST AFRICA REGIONAL NETWORK WITH FOCUS ON LAND AND FIRE ISSUES

A GOFC-GOLD Pan Africa Symposium will be held, from 12-16 November in Accra, Ghana, with two events taking place during the week: a three-day meeting of the emerging West Africa Regional Network (WARN), followed by a two-day meeting on the fire early warning system for Africa.

Background

Environmental change, related to both natural processes of climate variability and change and to social processes leading to land use change, is of great importance in Sub-Saharan Africa. Few African countries possess the required knowledge and information of environmental change processes taking place. This lack of information limits the ability of organizations to make informed decisions on environmental management. Earth observations are increasingly used in Africa to map and monitor land cover and forest change, including fire.

While some sub-regions within Africa have developed organizational structures through which coordinated research and action is being carried out – e.g., OSFAC (Observation par Satellite des Forêts d'Afrique Centrale) in Central Africa, the Miombo Network and SAFNet (South African Fire Network) in Southern Africa – West Africa is lagging somewhat behind.

In response, an international workshop on earth observations and environmental change was held in 2005 in Senegal. With support from GOFC-GOLD, over 50 scientists participated in a science review and synthesis of the long term impacts of environmental change in West Africa. The participants decided to proceed with the establishment of a West African Regional Network to support the applications of Earth observations needed to address the pressing development and environmental problems of the region. To kick off the network, two main thematic aspects were proposed: Land Cover/Land use and Fire. The upcoming Symposium is organized to further develop this activity (see box).

GOALS OF THE MEETING

1. To broaden and **consolidate the organization** and work of the West Africa Regional Network and **establish linkages** with other networks in Africa.
2. To **strengthen the integration** of space-based and in situ earth observations of land cover dynamics in West Africa, including operational early warning systems for fire.
3. To **contribute to the work of the Group on Earth Observations** (GEO) and related societal benefit areas in West Africa.

The meeting will involve regional scientists and members of the other African regional networks OSFAC (Central Africa), Miombo Network and SAFNET (Southern Africa).

Regional Network Meeting

The workshop will discuss the structure of the network, the roles and responsibilities of partners as well as scientific and resource management issues. Furthermore it intends to define starting projects for the Land Cover Change and Bushfires sub groups and to specify test sites for long term surveys.

Fire Workshop

A recent proposal to the UNISDR (Inter-Agency Task Force for Disaster Reduction) was developed by GOFC-GOLD and partner organizations to develop a global wildland fire early warning system. The objectives of the workshop are to provide an assessment of the African requirements for such systems.

Further information:

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UPCOMING LAND COVER EVENTS

EVENTS / CONFERENCES / WORKSHOPS

September 2007

ESA/AIMES Workshop: Coupling Earth System Models and Earth Observation for the Northern High Latitudes
Venue: Frascati, Italy
Date: 10-12 September
Info: http://www.congrex.nl/07m13/

GLOBMODEL: Workshop on Strengthening the Use of EO in Earth System Modeling
Venue: Frascati, Italy
Date: 12-13 September
Info: http://www.globmodel.info/

International Conference: Climate changes Spatial Planning (CcSP)
Venue: The Hague, The Netherlands
Date: 12-13 September
Info: http://www.klimaatvoorruimte.nl/pro3/general/start.asp?i=0&j=0&k=0&p=0&itemid=266

NERIN dry land workshop at NASA LCLUC Science Team meeting
Venue: Urumqi, China
Date: 20 September
Info: http://www.fao.org/gtos/gofc-gold/net-NERIN.html

GOFC-GOLD South America Network (REDLATIF) Regional Fire Meeting
Venue: Mar del Plata, Argentina
Date: 22 September

6th International Workshop of the EARSeL Special Interest Group on Forest Fires and Fire IT planning meeting
Venue: Thessaloniki, Greece
Date: 27-29 September
Info: http://web.auth.gr/earsel-ffsig/index.php

October 2007

2nd GlobCarbon User Consultation Meeting
Venue: ESRIN, Frascati, Italy
Date: 11-12 October
Info: http://dup.esrin.esa.it/projects/summaryp43.asp

Meeting of GOFC-GOLD Executive Committee and Land Cover Implementation Team
Venue: Boston, USA
Date: 22-26 October
Info: http://www.fao.org/gtos/gofc-gold

GOFC-GOLD fire workshop with Russia Space Research Institute annual terrestrial remote sensing conference
Venue: Moscow, Russia
Date: October

November 2007 and later

GTOS Steering Committee Meeting
Venue: Nairobi, Kenya
Date: 5-7 November
Info: http://www.fao.org/gtos/

GOFC-GOLD Pan Africa Symposium including West Africa Regional Network meeting & Fire danger requirements workshop
Venue: Accra, Ghana
Date: 12-16 November
Info: Michael Brady, Canadian Forest Service (email: MBrady@NRCan.gc.ca)

GEO Ministerial meeting and Plenary
Venue: Cape Town, South Africa
Date: 28-30 November
Info: http://www.earthobservations.org/index.html

GOFC-GOLD fire workshop with Russia Space Research Institute annual terrestrial remote sensing conference
Venue: Moscow, Russia
Date: November

UNFCCC Climate Change Conference (COP 13)
Venue: Bali, Indonesia
Date: 3-14 December
Info: http://unfccc.int/meetings/cop_13/items/4049.php

NEESPI Session at American Geophysical Union (AGU) Fall Meeting: Integrated Approach to Regional Climate and Environment Change Studies
Venue: San Francisco, USA
Date: 10-13 December
Info: Pasha Groismann (email: Pasha.Groisman@noaa.gov)

Newsletter archives of related projects

GLOBCOVER Newsletter: http://dup.esrin.esa.it/projects/summaryp68.asp

GLCN Newsletter (Global Land Cover Network): http://www.glcn.org/news/

The ESA GOFC GOLD Land Cover Project Office Newsletter:

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http://www.gofc-gold.uni-jena.de/sites/letter.php

If you have any suggestions or recommendations for future contributions in this Newsletter please feel free to contact us.

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