

LAND COVER AND CHANGE

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GOFC-GOLD CO-LEADING THE GEO FOREST CARBON TRACKING TASK

The Group on Earth Observations (GEO) established the forest carbon tracking (FCT) task in 2008 to provide operational support to countries wishing to establish a national system for forest monitoring and carbon reporting. The main goal of the GEO FCT task is to support countries on the path towards the establishment of sovereign national Monitoring, Reporting and Verification (MRV) systems, and the formation of a global network of MRV systems that comply with international agreements and guidelines (e.g. UNFCCC, IPCC).

LAND COVER IMPLEMENTATION TEAM CONTRIBUTES TO GOFC-GOLD STRATEGY REVIEW

The fourth GOFC-GOLD strategy meeting was held on 20 November 2009 at the International START Secretariat, Washington D.C., USA, read more on page 3.

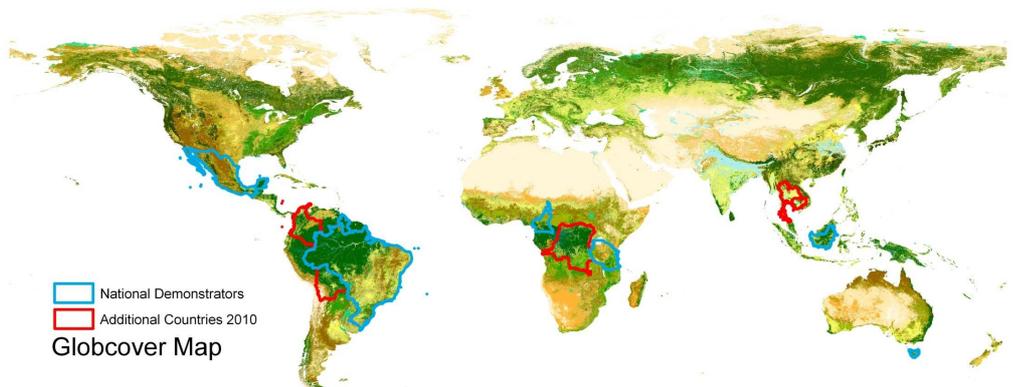


Fig. 1: Distribution of National Demonstrator countries to be address in 2009 and 2010 by the GEO task



Fig. 2: Strategy meeting

The FCT task has identified the following key elements as essential: easy access to a continuous supply of mid-resolution Earth observation satellite data; sufficient in situ forest measurements for emission verification; appropriate methods to estimate and predict future national or sub-national carbon stocks; and spatial-data infrastructure, Geographical Information Systems (GIS) and web-delivery systems to produce reports according to prescribed accounting and reporting rules. With the support of GOFC-GOLD, the task is demonstrating this capability, initially via the establishment of robust methodologies, satellite acquisition plans and a series of national demonstration areas (ND-National Demonstrators). Through a coordinate and iterative process, ND's are providing the elements to

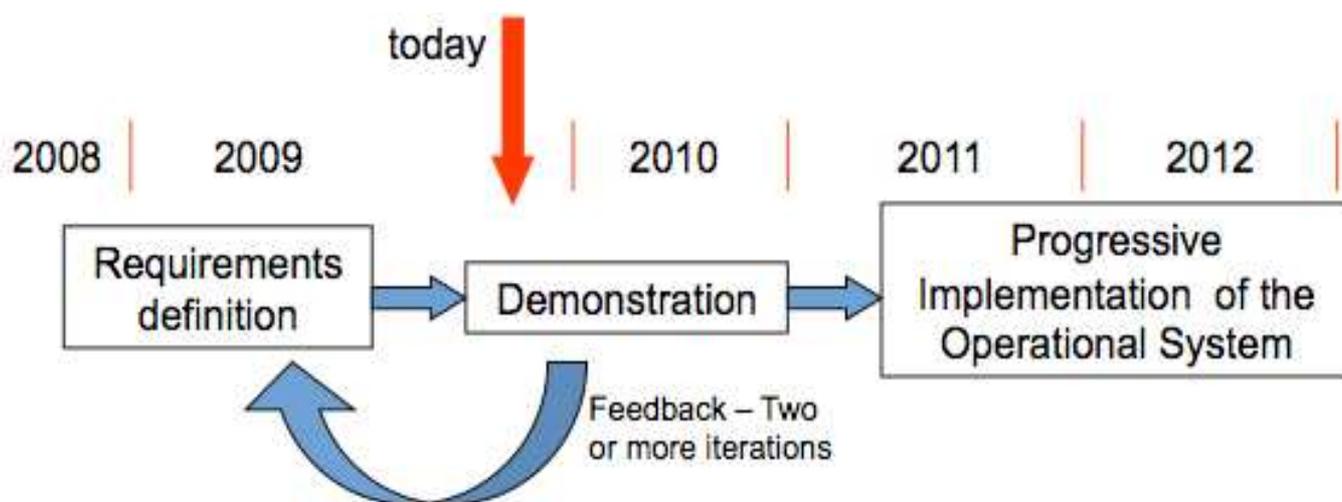


Fig. 3: Intended timeline for GEO Forest Carbon Tracking task activities

define a template for the roll-out of a consistent and reliable global system.

GOFC-GOLD acts as a co-lead in the FCT task, with contributions focused on formulating several key documents, including:

- Satellite Forest Information Product Specification

- Satellite Data Processing and Product Development Plan
- Methods on Validation of Remote Sensing Data Products and Accuracy Metrics
- National Demonstrator Guidance Document

More information on the GEO FCT task can be found at <http://www.geo-fct.org/>.

GOFC-GOLD PARTICIPATES IN THE GTOS 4TH STEERING COMMITTEE MEETING

The IV session of the Global Terrestrial Observing System Steering Committee was held in Paris, at UNESCO Headquarters, from 30 November to 2 December 2009. Main aims of the meeting were to take stock of the last biennium and plan the next 3 years. The new GTOS chair, Prof. Riccardo Valentini, was appointed on the 1st of October 2009, and was introduced at the meeting. A draft document containing elements of a new GTOS strategy was presented.

The GTOS panels, including GOFC-GOLD, presented their activities over the past two years and proposed suggestions, needs and actions. GTOS sponsors discussed the usefulness of GTOS in supporting their priorities.

The integration of GTOS with the other two global observing systems (GCOS and GOOS) and the GEO system of systems was discussed, and GTOS contributions to the environmental conventions were discussed as well. Other relevant and important programmes and initiatives were adequately represented during

the GTOS Steering Committee, and synergies with the GTOS programme were discussed. Finally, the new Chair presented his vision for a new GTOS strategy, a timeline for developing the new strategy.

The new GTOS strategy will build on existing partnerships, ensure the continuity of existing observation systems, and promote advocacy with policy makers. GTOS will act as a link between science and policy, and should ensure the interaction among different components of the global observation system. A key GTOS role will be the provision of standards on variables (ECV), methodology, reference sites, etc. To this end, GTOS will concentrate on a few specific focus areas including: climate change, terrestrial carbon stocks and fluxes, land degradation, and loss of biodiversity. Cross cutting these categories are the following vulnerable ecosystems/areas: coasts, mountains, snow and ice cover, and urban areas.

Details on the meeting can be found at: <http://www.fao.org/gtos/meetGTOS4.html>.

LAND COVER IMPLEMENTATION TEAM CONTRIBUTES TO GOFC-GOLD STRATEGY REVIEW

The fourth GOFC-GOLD strategy meeting was held on 20 November 2009 at the International START Secretariat, Washington D.C., USA. The meeting was associated with the 6th Plenary of the Group on Earth Observations (GEO) and the associated Symposium of the Integrated Global Observing Strategy Partnership (IGOS-P), which took place the same week at Washington.



Fig. 3: Discussions during the GOFC-GOLD strategy meeting

During the meeting the Land Cover Implementation Team reviewed its main activities, including: participation in global land cover mapping initiatives to increase detail, accuracy, and usability of existing and new map products; coordinating a working group on monitoring methods for REDD; coordinating several land cover tasks in the Group on Earth Observation (GEO) work plan; and formulating the GTOS/GCOS Essential Climate Variables (ECV) for land cover. Notable achievements of the team included: contribution to the development of standards reports for the Land Cover and Biomass ECV's; contribution to

GlobCover validation framework and implementation; comparative validation study of several global land cover products; REDD Side Events at UNFCCC SBSTA and COP; and a capacity building workshop on monitoring deforestation. Also discussed at the meeting were the priorities of other international programs. Inputs on GOFC-GOLD strategic directions were provided by representatives of Resources for the Future; Global Change Program (Heinz Center); and the Group on Earth Observations (GEO) Forest Carbon Tracking task.

The GOFC-GOLD strategic directions agreed at the meeting include four areas:

- 1) Set of activities to get ahead of curve: establish a biomass working group and an agricultural monitoring and land use group.
- 2) Maintain scientific aspects and enhance products: best of maps and validation; and parts of REDD.
- 3) Enhancing Capacity: continue to strengthen regional networks; taking experience with Data Initiative – develop concept of academies and bring those participants into validation activities; and find ways to partner more effectively with START and others (e.g., GEF).
- 4) Challenge from moving from research to operations: develop REDD methods (future directions based on upcoming agreement); contribute to GEO forest carbon tracking; and continue to specify selected ECVs.

The meeting concluded with the identification of next steps and a plan of work. The report on the fourth strategy meeting is in preparation and will be available shortly on the GOFC-GOLD website (<http://www.fao.org/gtos/gofc-gold/series.html>).

2009 PROCESSING IS ONGOING AT THE EUROPEAN SPACE AGENCY GLOBCOVER 2009 SHOULD BE AVAILABLE FOR VALIDATION AT THE END OF MARCH 2010

From January 2005 onward MERIS Full Resolution data at 300 meters resolution are systematically acquired and processed over all land surfaces. The GlobCover project builded an archive of about 100 Terrabyte of data (20 Terrabyte each year) The GlobCover 2005 has been downloaded by more than 10 000 users and serves as the most recent Global Land Cover map such as in the Time Atlas of the

World (image). The GlobCover processor has been installed at ESA and is currently used to automatically process the data from 2009. Once GlobCover2009 will be available it will be validated by a team of experts under the leadership of Pierre Defourny of the University of Louvain La Neuve. Public access to the GlobCover 2009 will be given not later than July 2010.

FREE USGS LANDSAT DATA FOR FOREST AND LAND COVER APPLICATIONS

Landsat data have been acquired continuously over the global land surface since July 1972 creating an unprecedented comprehensive record of landscape dynamics. As a joint initiative between the USGS and NASA, the Landsat Project and the data it collects support government, commercial, industrial, civilian, military, and educational communities throughout the world. While Landsat has been an important source for mapping and understanding the extent of global forest and land cover change, the realization of the full potential of Landsat was slowed by the cost of data. Even though Landsat data were relatively inexpensive (Landsat data prices have fluctuated from \$200 per scene to over \$4000), studies of large geographic areas (e.g., nations, continents) and long time periods were too often impossible due to data costs. In mid-2008, the USGS, with NASA's support, changed the Landsat data policy and this led to a revolutionary USGS decision to distribute Landsat digital images from its Landsat archive at no cost to data users.

In December 2008 the USGS announced that all Landsat data in the archive managed by the USGS Earth Resources Observation and Science (EROS) Center were now available to anyone via the Internet at no cost. The EROS Landsat archive includes approximately 2.5 million scenes spanning 1972 to the present – and it is growing daily. New Landsat 5 and 7 acquisitions acquired by the USGS are available for free shortly after they are received.

In order to make the full Landsat archive available at no cost, the USGS has adopted a single Landsat product specification. All scenes are calibrated to a consistent radiometric standard in order to facilitate the comparison of historical data and are processed to a terrain-corrected, ortho-rectified standard – Level 1T (or L1T).

The L1T specification is:

- Pixel size: 15m/30m/60m
- Media type: Download (no cost)
- Product type: L1T (precision & terrain corrected)
- Output format: GeoTIFF
- Map projection: UTM
- Datum: WGS84
- Orientation: North up
- Resampling: Cubic convolution

Web access to the USGS Landsat archive is through GloVis (glovis.usgs.gov) and Earth Explorer (earthexplorer.usgs.gov).

During the first year of the free data era, over 1 million scenes were downloaded. As of February 2010, over 1.5 million scenes have been distributed. To put this in perspective, prior to 2009, the most Landsat scenes sold in a single year was just over 20,000. In contrast, the daily number of scenes processed in January 2010 exceeded 20,000 several times. Clearly, the new Landsat data policy has initiated a revolution that is enabling larger-scale and longer-term studies of land cover and land use change.

The availability of free Landsat data is especially important for achieving the goals of GOF-C-GOLD, REDD, the Group on Earth Observations Forest Carbon Tracking initiative, FAO's Forest Resource Assessment, and many other projects dealing with land monitoring. Some of the benefits of the free Landsat data policy that are being realized include:

- Significant resource savings because Landsat data no longer need to be purchased.
- Enabling investigations that were previously not feasible. This is especially the case for large areas, long time periods, and persistently cloudy regions (tropics, high latitudes).
- Improving the accuracy of derived land cover products due to increase temporal density.
- Sparking innovation in advanced data handling and processing approaches.

The GOF-C-GOLD Regional Network Data Initiative has worked to facilitate access to free Landsat data. In April 2009, five representatives of Africa regional networks met at EROS in Sioux Falls, South Dakota USA to gather Landsat data covering their respective networks. The participants downloaded Landsat scenes and established regional collections, addressed data management strategies, and discussed steps for improving Landsat data access in Africa. Because of the success of the Africa workshop, a second Regional Network Data Initiative workshop is being organized in 2010 for Asia representatives.

The USGS is working on several Landsat

processing and data access improvements. For example, by the middle of 2010, Landsat Multispectral Scanner (MSS) processing will be upgraded in order to improve geolocation and radiometric calibration. Bulk download tools were recently made available that makes it easier to download large numbers of scenes. The USGS is also investigating steps for expanding the Landsat archive by including scenes held in International Cooperator archives. Finally, NASA and the USGS are working toward a December 2012 launch of the Landsat Data Continuity Mission. LDCM will continue to acquire Landsat-quality data that meet both NASA and USGS scientific and operational requirements for observing land use and land change.

Updates on Landsat and LDCM can be found at landsat.usgs.gov and landsat.gsfc.nasa.gov

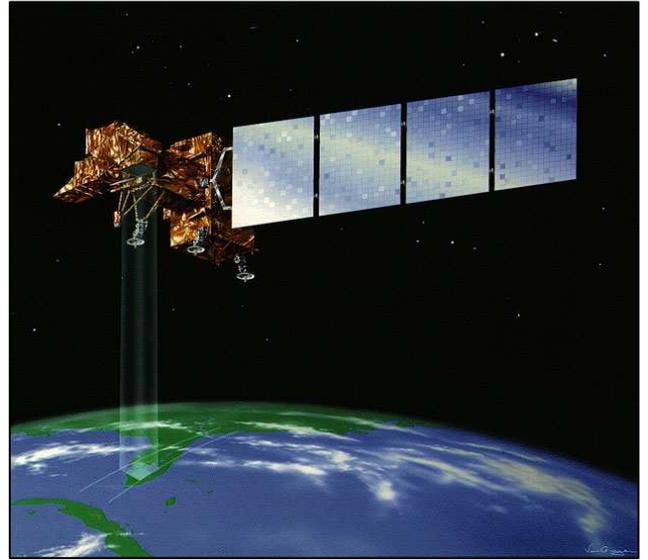


Fig. 4: Landsat satellite

JOINT NASA LCLUC SCIENCE TEAM MEETING AND GOFC-GOLD/NERIN, NEESPI, MAIRS WORKSHOP "MONITORING LAND COVER, LAND USE AND FIRE IN AGRICULTURAL AND SEMI- ARID REGIONS OF NORTHERN EURASIA"

Updates on Landsat and LDCM can be found at landsat.usgs.gov and landsat.gsfc.nasa.gov. The Joint NASA Land Cover Land Use Change (LCLUC) Science Team Meeting and Global Observations of Forest Cover - Global Observations of Land Dynamics (GOFC-GOLD)/Northern Eurasia Regional Information Network (NERIN), Northern Eurasia Earth Science Partnership Initiative (NEESPI), and Monsoon Asia Integrated Research Study (MAIRS) Workshop was held in Almaty, Kazakhstan September 15-19, 2009. The meeting was hosted by the National Center for Space Research and Technology (NSRTC) of Kazakhstan's National Space Agency (KNSA) - the leading national institution in Kazakhstan and one of the leading institutions in Central Asia focusing on development and operational implementation of land monitoring methodologies based on various remotely-sensed data sources. A total of 184 scientists and land managers from 16 countries (Belgium, China, Germany, Iran, Italy, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Ukraine, United States, and Uzbekistan) attended the workshop. The workshop opened with the address from the head of the KNSA Kazakh cosmonaut Talgat Musabayev. Brief presentations from Garik Gutman [NASA HQ—LCLUC Program Manager],

Jianguo Qi [NASA-MAIRS—Program Scientist], Multu Ozgodan [University of Wisconsin - NEESPI] and Olga Krankina [GOFC-GOLD/NERIN—Coordinator] followed the opening remarks and described the existing international programs involved in monitoring and assessment of environmental change in Central Asia. They also outlined opportunities for regional and international collaborations within the framework of these programs. Concern about the environmental impact of global climate change on the Central Asian region was at the forefront of the meeting agenda. The workshop focused on relating the observations of environmental and land-use processes directly to human well-being, linking the scientific research to operational land monitoring and decision-making support. Remotely sensed observations and analysis play an important role in quantifying changes in these phenomena and informing land management decisions. The workshop covered the four major themes of land cover, land use/agriculture, water resources, and fire with the goal of reviewing the existing regional approaches to monitoring these processes and the availability of satellite data sources, products, and monitoring capabilities. The participants identified five research areas of greatest concern:

- 1) the quality and quantity of fresh water resources as the strongest case for a regional network activity;
- 2) crop yield estimation, crop monitoring, and agricultural use of fire in the context of ensuring regional food security;
- 3) land and soil degradation leading to reduction in land productivity over time and increasing vulnerability of the natural and agricultural systems;
- 4) climate change and variability in the context of concerns for adaptation of human systems' different conditions, understanding processes, and informing policy makers; and
- 5) augmenting fire monitoring capabilities with regional fire ecology research in support of long-term fire management strategies.

At the end of the workshop, the participants voiced a unanimous consensus for better regional cooperation in addressing the issue of land monitoring in support of scientific research and decision making for resource management. The similarities in historical development of the region are now expressed in the similarity of the environmental issues across the region and potentially leading to trans-boundary tensions

over resource availability. Participants welcomed a decision to create the Central Asia Regional Information Network (CARIN) in the framework of GOFC-GOLD. CARIN will facilitate the continued flow and exchange of data and methodologies as well as scientific findings throughout the region. Representatives from all participating countries in Central Asia, including Kazakhstan, Uzbekistan, Tajikistan, Kyrgyzstan, Turkmenistan, Mongolia, China, and Russia, welcomed and supported the network. A planning meeting for the network will be held in Almaty, followed by a GOFC-GOLD Regional Network Workshop tentatively planned for 2011 to be hosted in Uzbekistan.

A two-day training session followed the workshop, with 63 meeting participants attending and additional support from the UNESCO G-WADI project (Water and Development Information for Arid Lands - A Global Network). The training aimed at informing the regional experts and decision makers about publicly available satellite-based datasets and introducing data processing methodologies necessary to ensure high quality of output.



Fig. 4: Workshop participants on the first day of the meeting

LPV SUB-GROUP MONTANA MEETING SUMMARY PRINTED IN EARTH OBSERVER

The Report on the CEOS Land Product Validation Sub-group Meeting in Montana (June 2009) was published in the Nov-Dec issue of the NASA Earth Observer Magazine.

http://eosps0.gsfc.nasa.gov/eos_homepage/for_scientists/earth_observer.php

PREVIEW: THE 4TH GOFc-GOLD SOURCEBOOK DEVELOPMENT WORKSHOP

From 5th to 9th of July 2010 the 4th GOFc-GOLD REDD Sourcebook development workshop: "Responding to the UNFCCC COP 15 outcomes: experiences, requirements, and actions to develop the next version of the GOFc-GOLD REDD Sourcebook" will be held at the Canadian Forest Service (CFS) in Victoria, Canada.

Recent activities have resulted in several rounds of updates the GOFc-GOLD sourcebook on: "A Sourcebook Of Methods And Procedures For Monitoring And Reporting Anthropogenic Greenhouse Gas Emissions And Removals Caused By Deforestation, Gains And Losses Of Carbon Stocks In Forests

Remaining Forests, And Forestation". Thirty-six international experts have contributed to the Sourcebook development to date. This group effort aims to provide further explanation, clarification, and methodologies in addition to IPCC Guidelines for reporting changes in forest carbon stocks at the national level, and to support REDD early actions and readiness mechanisms for building national REDD monitoring systems. Version COP 15.1 has been released at the UNFCCC COP 15 and is available for download (<http://www.gofc-gold.uni-jena.de/redd/index.php>). Given

the outcomes of COP 15, the ongoing use of the Sourcebook by countries and other actors involves in REDD MRV, the starting discussions by the IPCC national GHG inventory task force, the developments of evolving technologies, and the request and motivations by several experts and organizations to further engage in Sourcebook evolution, the GOFc-GOLD REDD working is organizing a 4th GOFc-GOLD REDD workshop. The key objective is displayed in the Box below. For more details visit http://www.grs.wur.nl/UK/Workshops/GOFc_GOLD/.

The key objective of the 4th Gofc-Gold Sourcebook development workshop:

Discuss key challenging issues and formulate technical and methodological recommendations to support building national level REDD MRV capabilities. The aim is to expand and improve what is already provided by the current Sourcebook and to expand to new topics that have been brought up in the recent political discussions and technical experiences on the national level, with a particular focus on:

- **Make recommendations through synthesizing experiences from developing countries working on REDD MRV development with particular emphasis on lessons learned from applying the current Sourcebook**
- Role of the monitoring of drivers and processes of forest carbon stock change and safeguards, and related links to policy developments on national level
- **Progress and assessment on evolving technologies, including activities of the GEO Forest Carbon Tracking task**
- Monitoring forest regrowth and degradation/changes in remaining forest areas to address issues related to sustainable forest management, forest conservation, and increase in forest carbon stocks
- **Methods and experiences on the accuracy assessments for forest area and area change**
- Management of information flows and building data infrastructures for estimation, reporting and uncertainty analysis and management on the national level

UPCOMING LAND COVER EVENTS

EVENTS / CONFERENCES / WORKSHOPS

May

32nd session of the UNFCCC Convention subsidiary bodies

Venue: Bonn, Germany

Date: 31 May-11 June 2010

Info: <http://unfccc.int/meetings/items/2654.php>

June

UNREDD-GEO FCT Workshop

Venue: Guadalajara, Mexico

Date: 22-24 June 2010

Info:

http://www.thereddesk.org/events/mrv_joint_workshop_with_un_redd_and_geo_fct/22_june_2010

Global Biomass Mapping session at ESA Living Planet Symposium

Venue: Bergen, Norway

Date: 28 June - 2 July 2010

Info: <http://www.congrex.nl/10a04/>

July

4th GOF-C-GOLD REDD Sourcebook development workshop: "Responding to the UNFCCC COP 15 outcomes experiences, requirements, and actions to develop the next version of the GOF-C-GOLD REDD Sourcebook"

Venue: Canadian Forest Service, Victoria, Canada

Date: 5-9 July 2010

Info: <http://www.grs.wur.nl/UK/Workshops/GOF-C-GOLD/>

Meeting of the GEO Subgroup towards a Global Forest Monitoring Facility

Venue: ESA-ESRIN, Frascati, Italy

Date: 13-14 July 2010

Contact: Martin.Herold@wur.nl

WMO CAgM meeting

Venue: Belo Horizonte, Brasil

Date: 15-23 July

Info: http://www.wmo.int/pages/prog/wcp/agm/cagm/cagm_15thsession.html

Biomass working group meeting, IGARSS 2010

Venue: Honolulu

Date: 25-30 July

Info: <http://www.igarss10.org/AcceptedList.asp>

August

NASA-LCLUC ST, NEESPI meeting and NERIN workshop

Venue: Tartu, Estonia

Date: 25-29 August 2010

Info: <http://lcluc.umd.edu/>

November

Redlatif and Serena general meeting**Venue:** TBD**Date:** November 2010**Contact:** Isabel.Cruz@conabio.gob.mx**SAFNet workshop****Venue:** TBD**Date:** TBD**Info:** <http://afis.meraka.org.za/safnet/>**7th GEO Plenary and Ministerial Summit****Venue:** Beijing, China**Date:** 3-5 November 2010**Info:** <http://www.earthobservations.org/meetings/meetings.html>**UNFCCC CoP 16****Venue:** Mexico City, Mexico**Date:** 29 November - 10 December 2010**Info:** <http://unfccc.int/2860.php>**2011****34th ISRSE, The GEOSS Era: Towards Operational Environmental Monitoring****Venue:** Sydney, Australia**Date:** 10-15 April 2011**Info:** <http://www.isrse34.org/>

Newsletter archives of related projects

GLOBCOVER Newsletter: <http://dup.esrin.esa.it/projects/summary68.asp>GLCN Newsletter (Global Land Cover Network): <http://www.glcnet.org/news/>**The ESA GOFc GOLD Land Cover Project Office Newsletter:**

The Newsletter is distributed free of charge to all members listed in the ESA Land Cover Project Office database. To update your information, to subscribe or to be removed from our database, please contact us or visit the newsletter website:

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

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

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