

Newsletter N° 29 | July 8

LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

Progress of the upcoming Sentinel-2 mission

With the first Sentinel satellite already in orbit, scientists and users gathered in Italy to discuss the progress of the upcoming Sentinel-2 mission and its many applications. About 400 attendees from 44 different countries convened on May 20-22 at ESA's ESRI centre for Earth observation in Frascati, for the Sentinel-2 for Science workshop.



Figure 1: Sentinel-2 satellite

Go to page 2 for more information on the launch schedule, the data access policy, and the applications of Sentinel-2 data.

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REDD Sourcebook Update: UNFCCC COP-19 Version 2



COP19/CMP9
UNITED NATIONS
CLIMATE CHANGE CONFERENCE
WARSAW 2013

A new release of the GOFC-GOLD REDD Sourcebook is now available on the website of the Land Cover Project Office. An update of the sourcebook was made for the last UNFCCC COP-19 (Warsaw, November 2013) with changes in

the **introduction section** to report on the UNFCCC decisions on REDD+, and in section 2.9 on **evolving technologies** to report on the latest research outcomes on Lidar and SAR technologies (text and reference list updated).

This new release contains an update of section 2.7 on the **estimation of uncertainties** for carbon stock estimates in relation with the IPCC Good Practice Guidance. Section 2.9 that provides **guidance on Green House Gas reporting** has been updated also. The sourcebook is available for download on the GOFC-GOLD LC PO website: www.gofcgold.wur.nl/redd



A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation

GOFC-GOLD
Global Observation of Forest and Land Cover Dynamics

Development of a REDD+ Curriculum with the World Bank FCPF

The GOFC-GOLD LC Project Office (LC PO) has been developing a REDD+ curriculum on monitoring and reporting, in partnership with the World Bank Forest Carbon Partnership Facility (FCPF). The training material is aimed to provide learning and teaching material to enable countries to develop capacities and implement REDD+ monitoring and reporting.

Some authors of the REDD Sourcebook have been invited to develop the training package that consists

in a set of 14 modules (lectures + country examples + exercises) based on the chapters of the REDD sourcebook (figure 2).

The modules are under external review and will be made available free of charge in September 2014, on the GOFC-GOLD LC PO and FCPF websites.

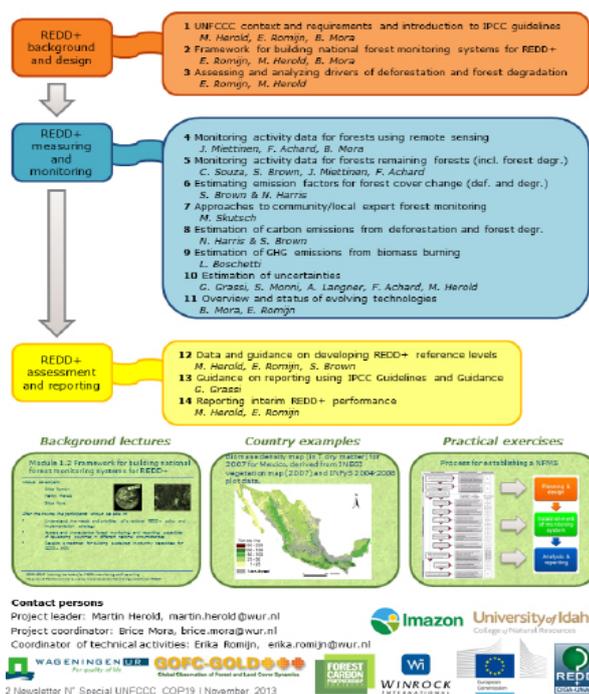


Figure 2: Modules of the REDD+ curriculum

Progress of the upcoming Sentinel-2 mission

The European Space Agency organized on May 20-22 in Ispra, Italy, a Workshop to report and discuss the progress of the upcoming Sentinel-2 mission.

Sentinel-2 mission has been developed for Europe's Copernicus environment monitoring programme. The mission composed of two satellites will provide high-resolution optical images suitable for land cover and change detection in agriculture and forest applications among several other applications.

Sentinel-2 satellites will have a wide swath width (290 km) and a high revisit time period (5 days with 2 satellites). The coverage limits are from between latitudes 56° south and 84° north.

Progress on discussions between ESA and NASA to provide compatible data products between Sentinel-2 and Landsat were reported. In addition to the data continuity, the Sentinel-2 satellites will provide data at higher revisit time frequency allowing notably the development

of effective early warning land cover change monitoring systems and a higher chance to obtain cloud-free observations over tropical regions. The tracking of forest degradation will benefit from the higher revisit time period combined with the higher spatial resolution (up to 10 m) of Sentinel-2 data. Last year's approval of the European Delegated Act on Copernicus data and information policy officialised the full

and open access to Sentinel-2 data, free of charge.

The launch of Sentinel-2A is scheduled at the end of April 2015 and Sentinel-2B about one year later. For more information on the Sentinel-2 mission please visit:

<https://sentinel.esa.int/web/sentinel/missions/sentinel-2>



Figure 3: Participants of the Sentinel-2 Science Workshop

Sentinel-1A Launched

ESA has been developing a new family of missions called Sentinels specifically for the operational needs of the Copernicus programme. Each Sentinel mission is based on a constellation of two satellites to fulfil revisit and coverage requirements, providing robust datasets for Copernicus Services.

Sentinel-1 is a polar-orbiting, all-weather, day-and-night radar imaging mission for land and ocean services. Sentinel-1A was launched on 3 April 2014. The instrument on board is a C-band synthetic aperture radar (SAR) at 5.405 GHz and



will provide images at a minimum spatial resolution of 5 * 5 m. The Interferometric

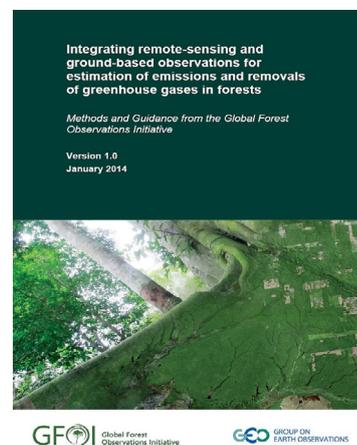
Wide swath mode will be the main acquisition mode over land.

Sentinel-1 will serve applications in the fields of monitoring sea ice, oil spills, marine winds & waves, land-use change, land deformation among others, and to respond to emergencies such as floods and earthquakes. First Sentinel-1A data is expected to be available to all users late summer 2014. Dedicated information on the Sentinels including how to access the data is available under <https://sentinel.esa.int>.

Release of First Method and Guidance Document from GEO GFOI

The Global Forest Observations Initiative (GFOI), an initiative of the inter-governmental Group on Earth Observations (GEO) has released at GEO Summit X the first version of a Method and Guidance Document (MGD) on the estimation of future carbon stocks to support countries in their effort to build national forest monitoring systems. The document provides recommendations on establishing national Measurement, Reporting and Verification (MRV) systems consistent with IPCC guidance and UNFCCC requirements.

The GFOI MGD is being developed by of a world-class team of experts and stakeholders (including from FAO and GOF-C-GOLD) specialising in forest information systems and the observations underpinning those systems, as well as experts in the assessment of forest carbon emissions and removals. The MGD can be downloaded for free on this page: <http://gfoi.org/>



How the GOF-C-GOLD Sourcebook and the GFOI Methods and Guidance Document relate?

The GOF-C-GOLD Sourcebook (the Sourcebook) and GFOI's Methods and Guidance Document (the MGD) both address estimation of greenhouse gases associated with land use, especially forests and in particular the activities identified by the UNFCCC under its agenda item related to reducing emissions from deforestation and forest degradation and associated activities (REDD+). Both aim to be consistent with the guidance and guidelines provided by the IPCC. They are produced in consultation and are intended by GOF-C-GOLD and GFOI to be used together and provide complementary functions, namely:

- the purpose of the Sourcebook is to provide an annually updated review of

the science related to estimating emissions and removals associated with forests, consistent with IPCC guidance. The Sourcebook is mostly conceptual on how to acquire key data with concrete examples and documented experiences, and focusses on what is scientifically feasible at the national level, with up-to-date information on evolving technologies, taking account of GFOI's review of R&D.

- the purpose of the MGD is to provide step-by-step advice on how to estimate emissions and removals associated with REDD+ activities, which are systematically described and linked to IPCC guidance. MGD describes the use of remotely sensed and ground based data in combination. It focuses on methods

that are ready for implementation, linked to data made freely available by the Space Agencies via Space Data Coordination Group established specifically for this purpose. In practice the MGD is a manual and the Sourcebook a scientific and technical review synthesized for the purpose of IPCC-guided estimation. It is expected that in implementing a national forest monitoring system national experts might follow the steps set out in the MGD and cross-reference the Sourcebook for further scientific advice. The Sourcebook is intended mainly for the technical experts actually engaged the analysis. The MGD is also relevant to those planning and managing the process.

An Analysis of Global Reference Data Sets

A study from the GOCF-GOLD Land Cover Office and Wageningen University was performed to assess the quality and suitability of different global land cover reference (GLC) datasets according to the needs of different user communities. Several GLC reference datasets exist however despite significant efforts to generate them, their availability and role in applications outside their intended use have been very limited. The meta-data information of twelve existing and upcoming reference datasets was performed to assess their potential usability for four user groups: climate modellers in

the context of the Essential Climate Variables, global forest cover change analysts, the GEO Community of Practice for Global Agricultural Monitoring and GLC map producers. The sampling scheme, thematic coverage, spatial and temporal detail and quality control of the GLC reference datasets were considered to perform this analysis. The study shows the datasets from the ESA Land Cover Climate Change Initiative, the GOCF-GOLD, the FAO-FRA, and the Geo-Wiki provide the largest potential for multiple uses.

The GOCF-GOLD Land Cover Project

Office will use the outcomes of this study to improve the reference data portal that is currently under development, with the provision of guidance information to the users to select most suitable datasets.

This study is reported in a paper accessible online:

<http://www.sciencedirect.com/science/article/pii/S0924271614000458>

Land Cover for Climate (LC4Climate) project from USDI

The U.S. Department of the Interior's International Technical Assistance Program's (DOI ITAP) Land Cover for Climate (LC4Climate) project aims to enhance the capacity of developing country partners to improve techniques to generate and/or update existing land cover information using satellite imagery. Funding for LC4Climate is provided by USAID's Global Climate Change program.

Land cover and land use data are critical components for climate monitoring applications such as: greenhouse gas emission (GHG) reports, measuring rates of deforestation (REDD+), low emission development strategies (LEDS).

An important secondary objective is to use the national level land cover datasets to improve the high resolution 30 meter U.S. Geological Survey (USGS) Global Land Cover database.

Land Cover for Climate works with ongoing initiatives in Africa and Southeast Asia to:

- Conduct technology assessment of existing land cover datasets,
- Improve and apply appropriate methodology for local needs,
- Host regional and national capacity building activities,
- Facilitate participation of local expertise for enhancing global land cover initiatives.

Ultimately, these datasets will be

used to analyse the effects of climate change on partners' areas of concern, to deliver accurate data for carbon sequestration assessments, and to provide a collaborative pathway to improve the global land cover data.

Current activities include:

– Africa

- Co-hosted with RCMRD, UNEP, and Tsinghua Univ., the International "Symposium on Land Cover Mapping for the Continent of Africa", June 2013, Nairobi, Kenya,
- Providing support to the GEO Working Group on Land Cover Mapping for Africa,
- Upcoming Eastern Africa (South Sudan, Uganda, Rwanda, Burundi,

Tanzania, Malawi, Mozambique, Swaziland, Lesotho, and Kenya) participatory workshop to review the USGS 30 meter land cover dataset (March 2014),

- Upcoming scoping trip to Malawi to conduct an inventory and applications analysis of existing land cover datasets (March 2014),

– Southeast Asia

- Co-hosted with the Mekong River Commission (MRC), the "Symposium on Applying Earth Observation Satellite Data to Monitor Land Cover Change in the Mekong Basin" (August 2013),
- Conducted a six-day technical training workshop on remote



Figure 4: Attendees at the International Symposium on Land Cover Mapping for the African Continent, held in Nairobi, Kenya in June 2013

sensing and land cover mapping with participants from Laos, Cambodia, Vietnam, and Thailand (August 2013),

- Collaborated with the Vietnamese Ministry of Natural Resources and Environment and the Netherlands Space Office to provide technical training in optical and radar remote sensing imagery and land cover mapping for 14 Vietnamese Agencies (December 2013),
- Planned: Co-host with the MRC a Mekong River Basin participatory workshop to review the USGS 30 meter land cover product (Summer 2014),
- Planned in conjunction with the SilvaCarbon Program: Symposium on the status of Land Cover activities in Laos, Cambodia, Vietnam, Thailand, Nepal, and Indonesia (in conjunction with SilvaCarbon Program) (Summer 2014).

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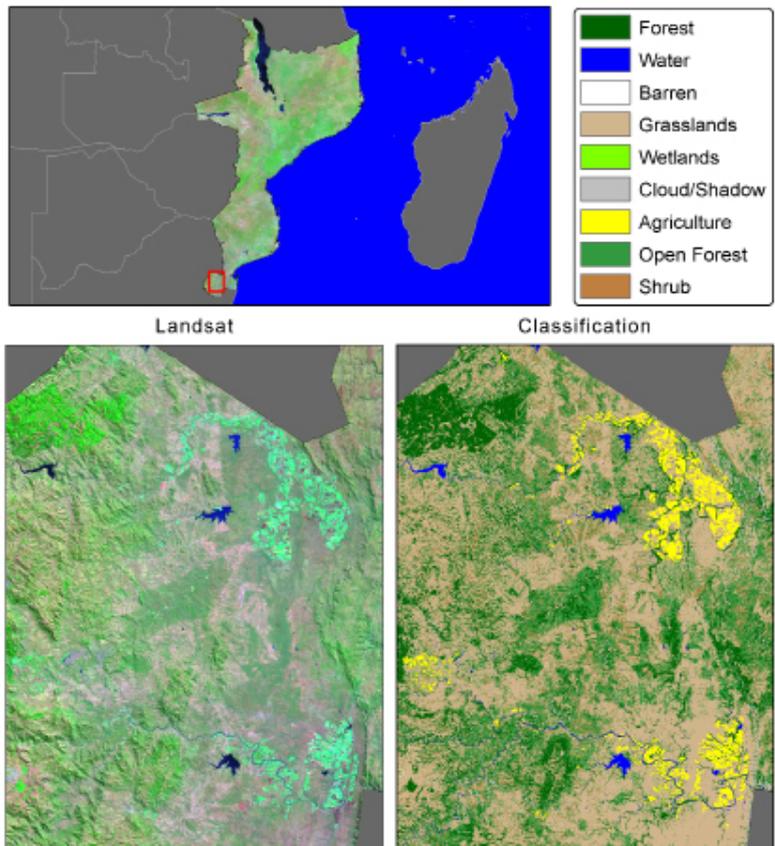


Figure 5 Progress on completing the USGS 30 meter Global Land Cover dataset for Eastern Africa. Images below show a Landsat 8 mosaic and land cover classification for a portion of Swaziland

Free Access to SPOT Archive for Research

SPOT satellite images older than 5 years will be made available free of charge for non-commercial use. The announcement was made by the French Government and the Centre National d'Études Spatiales (CNES) during the last Group on Earth Observations (GEO) Summit in Geneva last January. Imagery dating back to 1986 will be made available and has the potential to aid land cover change monitoring activities in the context of the Kyoto Protocol nota-

bly. However the policy excludes SPOT-5 images at 10m spatial resolution and higher. SPOT satellite series has acquired more than 30 million images over nearly three decades. Data acquisition by SPOT-5 keeps going on and continuity of observations will be ensured up to 2024 by SPOT-6 (launched in 2012) and SPOT-7 (launch scheduled in 2014).



GEO Ministerial Side-Event on Global Land Cover and Change



The GOCF-GOLD Land Cover Project Office was in Geneva (January, 13-17) to participate in the Group on Earth Observations (GEO) Ministerial Summit. The LC PO organized as Task Leader (SB-02 Task), an internal meeting and a public side-event dedicated to Global Land Cover & Change (GLC) activities.

Participants to the meeting and oral presenters included notably the European Environment Agency, Tsinghua University, Instituto Geográfico Nacional - Spain, IIASA, the U.S Department of Interior, the E.C. Joint Research Centre, U. catholique de Louvain, and the Regional centre for Mapping of Resources for Development - Kenya.

Consensus was found among the participants on the necessity to improve

the coordination towards the development of a GLC data portal and a reference data portal. Prof. Chen Jun (Tsinghua U.) proposed the Task participants to issue a resolution requesting support from the GEO Parties for the design and development of a validation framework for high spatial resolution land cover map products, to recognize the importance of delivering validated land cover information, and foster the use

of the most appropriate standards and best practices. Parties should nominate participants to carry out these tasks. Discussions pointed out also the necessity to identify clearly the data users, adopt standards (e.g., land cover classification system), define a common data model, and ensure formal engagement of the countries to guarantee subsequent acceptance and use of the data portal. Product enhancement should be considered as well.

Participants of the side meeting agreed on the necessity to develop coordination of the capacity development activities to avoid duplicated activities in some regions. The presentations are available online: www.earthobservations.org/geo10.shtml

Land Cover for Africa WG

Dr. Hussein Farah, Chair of the Land Cover for Africa Project, participated in the side event and presented a new working group (WG) of the GLC Task.

- Objectives of the new WG are:
- Contribute to the development of land cover products at 30m resolution,
 - Raise awareness of land cover data, tools, applications,
 - Build capacity of national and regional institutions,
 - Facilitate networking between land cover experts.

A call for participation in the Land Cover

mapping for Africa WG was made. Experts and Institutions in Africa are invited to participate in the activities and provide support. International and Development Partners are also invited to collaborate providing technical and capacity development support.

For more information please contact Dr. Hussein Farah: farah@rcmrd.org



Figure 6: Some participants of the Global Land Cover & Change Task side-event

ESA Land Product Validation and Evolution (LPVE) Workshop

The European Space Agency organised a workshop on calibration, validation and evolution of land products. The workshop was held at ESA/ESRIN in Frascati, Italy, on January 28-30, 2014. The workshop was an opportunity for experts in calibration and validation to present and discuss the latest results from their on-going research, including the evolution of products, the development of validation, the inter-comparison methodologies and the evolution of algorithms. The workshop focused on optical imaging sensors from ESA missions (MERIS, (A)ATSR, PROBA-V, etc.), ESA Third Party Missions (LANDSAT, ALOS, etc.), and national missions.

Specific objectives of the workshop were:

- Present Cal/Val results for land products from ENVISAT and ESA Third Party Missions, as well as from related missions from other space agencies;
- Present improvement of land products Cal/Val methods and techniques;
- Present land product intercomparison methodologies (in situ, satellite-satellite);
- Identify key recommendations for ESA land product algorithm evolution;

- Formulate recommendations for future land products and future Cal/Val activities;
- Encourage close collaboration between Cal/Val and research groups.

The GOFC-GOLD LC PO presented a study aimed to inform different user communities (climate modelling, agriculture, forestry, global land cover mapping) on the suitability of different global land cover reference datasets with respect to their specific requirements. The current version of the GOFC-GOLD

reference data portal and the upcoming improvements were also presented.

A second oral presentation focused on an on-going study at Wageningen University aimed to integrate different data sources for validating large-area biomass maps.

The presentations of the LPVE workshop are available online on the CEOS Cal/Val Portal in the Events section: <http://calvalportal.ceos.org/events/lpve>.



Calendar of Upcoming Events

Event	Date	Venue	Information
IGARSS 35th Symposium on Remote Sensing	13-18 July 2014	Quebec City, Canada	http://www.igarss2014.org/
Global Fair and Workshop on Mountain Observatories	16-19 July 2014	Reno, NV, USA	http://mri.scnatweb.ch/fair-and-workshop-on-mountain-observatories/home
GEO GFOI / GOFC-GOLD workshop on forest degradation monitoring for REDD+	1-3 October 2014	Wageningen U.	brice.mora@wur.nl
XXIV IUFRO World Congress	5-11 October 2014	Salt Lake City, USA	http://www.iufro.org/events/congresses/2014/
ForestSAT Conference	4-7 November 2014	Riva del Garda	http://forestsatsat2014.com/
UNFCCC COP 20	1-12 December 2014	Lima, Peru	http://unfccc.int/meetings/lima_dec_2014/meeting/8141.php
36th International Symposium on Remote Sensing of Environment	11-15 May 2015	Berlin, Germany	http://www.isrse36.org/
ESA GlobBiomass / GFOI meeting	24-26 February 2015	Brisbane, Australia	<i>in the next newsletter</i>

Table 1: Upcoming events

Acknowledgements

The GOFC-GOLD LC PO wishes to thank Jean Parcher from the United States Department of Interior for providing material on the Land Cover for Climate project. We thank the GEO GFOI Office for providing material and information on the MGD, and the European Space Agency for providing information on the launch of Sentinel 1A, and information on the Sentinel-2 for Science Symposium.

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<http://www.gofcgold.wur.nl/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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