

Newsletter N° 27 | October 30

LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

Workshop on Global Land Cover Validation

The GOFC-GOLD Land Cover Project Office organised in coordination with the Boston University, a training workshop on the validation of global land cover map products.



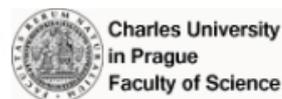
The aim of the workshop was to contribute to the development of a global land cover reference dataset based on the classification of Very High Spatial Resolution (VHSR) images. See page 2 for more information.



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SCERIN Regional Network meeting in Prague



The South Central and Eastern European Regional Information Network (SCERIN) met at Charles University, Prague, Czech Republic on June 17-22, 2013. The event entitled "Monitoring Land Cover Changes & Forest Condition" gathered 41 scientists from Czech Republic, Slovakia, Romania, Greece, Turkey, Hungary, Poland, Ukraine, EC-JRC, the U.S.A, and The Netherlands.

Participants presented the main accomplishments and on-going activities from their respective research teams. Topics were: forest condition, phenology, disturbances and biomass, land cover change, national test sites, river

deltas, grassland management practices, and urban settlements.

Breakout discussion groups were organised to discuss the research needs of the SCERIN Network in the following fields: forest change processes and drivers, land cover change due to anthropic activities (urbanization, agriculture, hydro-power dams). Comparison and validation of land cover products of the region (high and low spatial resolution). Development of new land cover products regionally adapted, establishment of regional and local land cover product validation sites, and establishment of a regional library to document species spectral diversity.

Discussions have started on the development of common research projects among the teams participating in the network.

The presentations made during the workshop are [available here](#).



Figure 1: participants of the SCERIN meeting in Prague

A Tree Allometric Equation Platform



The FAO, the French “Centre de coopération internationale en recherche agronomique pour le développement” (CIRAD), and Tuscia University, Italy, have developed the GlobAllomeTree tool, a web-based platform to facilitate access to tree allometric equations to support climate-change projects in relation to forests. The platform has been opened in 2013 and provides:

- an harmonized database of tree and stand volume and biomass allometric equations
- a software to compare equations
- an easy access to scientific information on allometric equations
- tutorials and other documents sup-

porting the development and use of the tree allometric equations (e.g., peer-reviewed literature).

Currently the platform provides equations for a total of 57 countries, from

boreal to tropical rain forests. The platform will be updated continuously.

The platform is accessible from this website: <http://www.globallometree.org/>



Figure 2: main page of the GlobAllomeTree platform

Workshop on Global Land Cover Validation

The GOFC-GOLD Land Cover Project Office in partnership with Boston University organized a training workshop on global land cover validation on the campus of Wageningen University (July 4-19). The aim of the workshop was to contribute to the development of a global land cover reference dataset based on the classification of Very High Spatial Resolution (VHSR) images. A total of 10 students participated in this workshop under the supervision of two PhD students: Nandin-Erdene Tsendbazar (Wageningen U.) and Christopher Holden (Boston U.).

The sampling design of this reference dataset has been made using a stratified random selection based on the Köppen climate/vegetation classification and population density map (Olofsson et al. 2012). A total of 500 refer-

ence sites was selected, with each site being a 5 by 5 km block (Figure 1). VHSR images have been acquired over these sites. The classification is being done at two levels. A Level 1 reference land cover classification is being created by the USGS using a 7-class legend with a minimum mapping unit of 2 m x 2 m. In parallel a

Level 2 reference classification is being created by further specifying a set of sub-classes within the Level 1 classes at finer resolution (usually 0.5 or 0.6 m) (Table 1). During the workshop progress was made on Level 2 dataset. An unsupervised classification algorithm (K-means) was employed using the Level 1 product as a mask. Manual

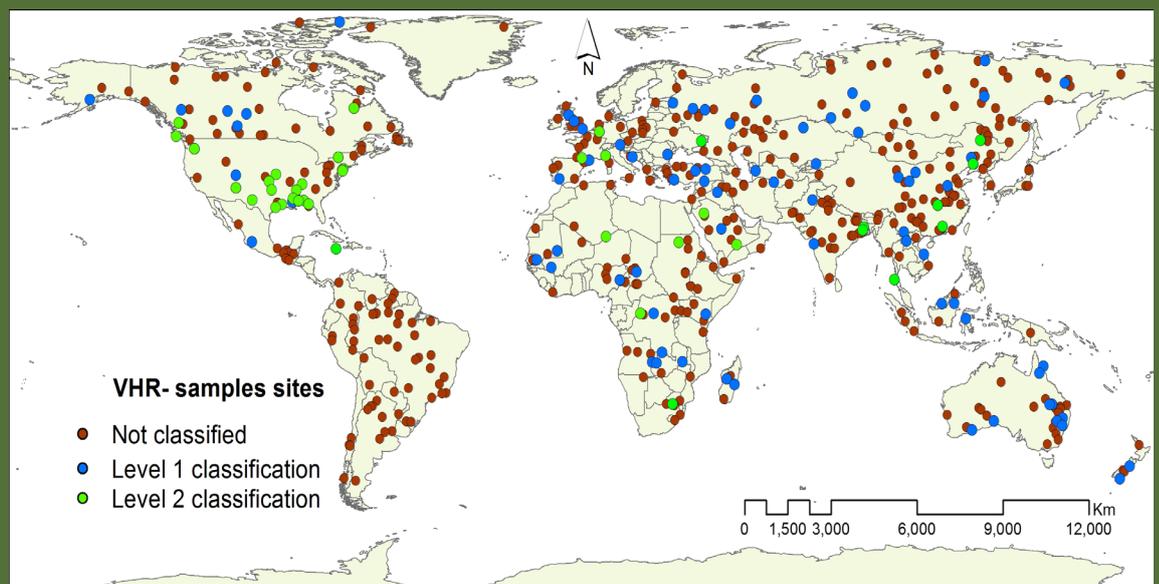


Figure 3: Progress on production of Level 1 and 2 classification products

editing was used when necessary. A total of 15 scenes were interpreted during the two weeks bringing the total number of Level-2 sample plots to 43. Some students showed interest to continue participating in the project and will interpret additional scenes as part on their thesis during this fall. The data will be made available on the GOFC-GOLD LCPO reference data portal (www.gofcgold.wur.nl/sites/gofcgold_refdataportal.php).

We acknowledge the Masters of Geo-Information (MGI) course students, workshop supervisors and

lecturers for their interest and efforts put into this workshop.

We will keep you informed on the availability of this dataset via this newsletter. You can follow us on Twitter ([@gofcgold_lc](https://twitter.com/gofcgold_lc)) and Facebook ([gofcgold_lc.po](https://www.facebook.com/gofcgold_lc.po)) as well.

Reference:

Olofsson, P., Stehman, S.V., Woodcock, C.E., Sulla-Menashe, D., Sibley, A.M., Newell, J. D., Friedl, M.A., Herold, M. (2012). A global land-cover validation data set, part I : fundamental design principles. *International Journal of Remote Sensing*, 33(18), 5768–5788.



Level 1	Level 2
1. Trees	0. Unknown 1. Broadleaf evergreen 2. Broadleaf deciduous 3. Needleleaf evergreen 4. Needleleaf deciduous
2. Water	1. Water
3. Barren	0. Unknown/unspecified 1. Natural bare land 2. Built-up
4. Other Vegetation	0. Unknown/unspecified 1. Shrubs 2. Crops 3. Other herbaceous
5. Snow/Ice	1. Snow/Ice
6. Clouds	1. Clouds
7. Shadow	1. Shadow

Table 1: Legends of Level 1 and 2 classification products

GOFC-GOLD Miombo Network

The newsletter comes back on the Miombo Network meeting that was held in Maputo, Mozambique on 23-25th of July. We provide the summary of the discussions and additional information on the future activities of the network.

Background and Rationale

The Miombo Network (MN) is the oldest regional network in southern Africa that fosters collaborative efforts in land cover monitoring and management in the region. The goal of the network is to support the development of sustainable miombo woodlands policies and practices through information derived from remote sensing and other geospatial information technology. For many years the network was inactive but there is a common opinion that it is time to reinvigorate this important regional network.

The meeting in Maputo was hosted by the Forestry Department, Eduardo Mondlane University (UEM) under the auspices of the GOFC-GOLD land cover Implementation Team and sponsored by START, RUFORUM and UEM.

The objectives of the meeting were:
1) to review the goals of the network;
2) to review and update the MN science plan;

- 3) to explore the role of the network;
- 4) discuss the GOFC-GOLD training initiative and
- 5) discuss the network governance.

Results

The meeting was divided into 6 sessions:
Session 1: Miombo woodland country status (Mozambique, Tanzania, Malawi, Zambia, Zimbabwe and Angola), which also included an overview of the SADC forestry, REDD and fire program. Discussions focused on common challenges for management and research needs in the region and how the network can contribute to the SADC forestry program.

Outcomes: miombo woodlands have experienced modifications across the region due to several common factors (energy, mining, shifting cultivation, etc), but there is a wide range of initiatives either with the support of international or national institutions that are being carried out in the region. Potential for collaborative initiatives was discussed during the session. MN must have an active role in the SADC forestry program. A policy brief aiming the next SADC forestry program meeting is planned.

Session 2: Monitoring Miombo Woodlands in which 4 key speakers were invited to present and discuss data, methods and techniques for MW monitoring including the existent opportunities with new landsat free data, improvements in land cover mapping using user friendly algorithms and the use of remote sensing for fire and woodlands structure assessment.



Figure 4: Participants of the Miombo network meeting

Outcomes: information about existing data, algorithms and possibilities for collaboration among the region.

Session 3: Measuring Carbon stocks and REDD which started with a presentation of the GOFC-GOLD REDD+ activities and the sourcebook including the production of training material, followed by discussions on carbon stock estimations in the region (data and techniques available including remote sensing) and the importance of involving rural communities in REDD+ initiatives.

Outcomes: dissemination of the REDD+ sourcebook is important as well as the establishment of a common protocol for carbon estimation and training on field and satellite data collections and analysis.

Session 4: Road map development towards science plan a session that was dedicated to group discussions on key science areas for miombo woodlands. The identified focal areas are:

- 1) Patterns and rates of land cover change;
- 2) Land use change inte-

grated analysis: Process and drivers of land use change,

- 3) Carbon and Biomass;
- 4) Ecology;
- 5) Miombo ecosystem management and adaptation to climate change and
- 6) Human dimensions of the miombo ecosystem.

Outcomes: for each focal area the networkers identified priority projects, key results and datasets, potential partners, implementation strategy, research coordination, opportunities for funding and synergies with sister networks.

Session 5: Networking in southern Africa and fields of cooperation a session that intended to discuss the possibilities of synergizing with well-established sister networks in the region, namely Safnet, OSFAC and SASSCAL.

Outcomes: potential for collaboration and joint-meeting MN-Safnet was suggested.

Session 6: Miombo Network Governance in which the steering committee

was elected. It was decided to elect a interim Steering Committee (SC) composed of 9 members namely: Natasha Ribeiro (Chair-Mozambique), Sally Archibald (south Africa), David Nangoma (Malawi), Stephen Syampungani (Zambia), Lawrence Mbwambo (Tanzania), Charles Jumbe (Malawi), Jean Mueng (DRC), Isilda Nhamumbo (IIED -Mozambique) and Paul Desanker (UNFC-CC-Malawi). The SC held its first meeting after the MN meeting and delineated several activities including the production of a very concise and sharp meeting report. Issues of funding, marketing strategy and network structure were also briefly discussed but will be further addressed by the SC. The committee agreed on meeting again either virtually or physically on the 20th of February 2014.

Planned activities also include the finalization of the network's science plan, which sets up the network's target activities for the next 5 years, and the development of a common protocol for monitoring of the woodlands.

30 meter global land cover map updates

The Center for Earth System Science, Tsinghua University, China has released to public an improved 30 meter global land cover map.

Following the first version of 30 meter global land cover mapping produced by applying automatic supervised classification algorithms to approximately 8900 Landsat TM/ETM+ images released at the end of last year, further improvements have been made to improve overall accuracy and visual appearance. A segmentation-based approach was used to integrate multi-resolution datasets (including Landsat TM/ETM+ (30 meter), MODIS EVI time series (250 meter), Bioclimatic variables (1km), global DEM (1km), Soil-water variables (1km)) for global land cover mapping. Accuracies for vegetation land cover types (i.e. cropland, forest) and barelands were dramatically improved. A further improvement by aggregating multiple land cover maps shows

the best overall accuracy of 65.51%. It was reported by an accuracy assessment using more than 38,000 globally distributed validation samples, which were collected with an unbiased systemic sampling strategy.

This new global land cover map led to the production of a 30 meter global cropland map by the Tsinghua team. Access the data:

<http://data.ess.tsinghua.edu.cn>



Finer Resolution Observation and Monitoring -Global Land Cover

[Homepage](#) [Download by MODIS Tile \(FROM-GLC\)](#) [Download by Path/Row \(FROM-GLC\)](#)

News
 International Symposium on Land Cover Mapping for the African Continent: <http://data.ess.tsinghua.edu.cn/SLandCoverAfrica.html>
 Well pump to http://www.cess.tsinghua.edu.cn/pub/ah/lesson/774/2013/2013011543088133384066_01307151430813384066_.html

Release of FROM-GLC-agg (08 February, 2013)
 FROM-GLC download web URL: <http://data.ess.tsinghua.edu.cn/index.html>
 FROM-GLC-seg download web URL: http://data.ess.tsinghua.edu.cn/landsat_pathList_fromcseg_0_1.html
 FROM-GLC-agg download web URL: http://data.ess.tsinghua.edu.cn/landsat_pathList_fromcseg_0_1.html
 * If you do not know the MODIS tile number of your area of interest, please click http://modis.land.gis.nasa.gov/MODLAND_grid.htm to use their spatial query to find it out.
 * If you do not know the Landsat Path and Row number, please click http://landsat.usgs.gov/tools_csf.php to use their spatial query to find it out.

About FROM-GLC
 Global land cover data are key sources of information for understanding the complex interactions between human activities and global change. FROM-GLC (Finer Resolution Observation and Monitoring of Global Land Cover) is the first 30 m resolution global land cover maps produced using Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper Plus (ETM+) data. Our long-term goal in FROM-GLC is to develop a multiple stage approach to mapping global land cover so that the results can better meet the needs of land process modeling and can be easily cross-walked to existing global land cover classification schemes.

Classification system

Level 1 Type	Level 1 Code	Level 2 Type	Level 2 Code	Level 2 Type	Level 2 Code	Level 2 Type	Level 2 Code	Level 2 Type	Level 2 Code	Level 2 Type	Level 2 Code	Level 2 Type	Level 2 Code
Crop	10	Rice	10/11	Greenhouse	10/12	Other	10/13						
Forest	20	Broadleaf	20/21	Nearbroadleaf	20/22	Mixed	20/23	Orchard	20/24				
Grass	30	Mangrove	30/31	Nature	30/32								
Shrub	40												
Wetland	50	Grass	50/51	Silt	50/52								
Water	60	Lake	60/61	River	60/62	River	60/63	Sea	60/64				
Tundra	70	Shrub	40/71	Grass	30/72								
Impervious	80	High albedo	80/81	Low albedo	80/82								
Bareland	90	Saltmarsh	90/91	Sand	90/92	Gravel	90/93	Bare-cropland	10/94	Dry river/lake bed	90/95	Other	90/96
Snow/ice	100	Snow	100/101	Ice	100/102								
Cloud	110												

Figure 5: The website interface for data access

Improving Global Land Cover with Geo-Wiki

Geo-Wiki is a visualization, crowdsourcing and validation tool for improving global land cover developed jointly by the International Institute for Applied Systems Analysis (IIASA), the University of Applied Sciences Wiener Neustadt and the University of Freiburg.

Using Geo-Wiki, users can visualize global land cover maps on top of Google Earth as well as maps of spatial disagreement. The latter highlight areas where the major global land cover maps disagree in the forest and cropland domains.

IIASA runs crowdsourcing competitions to collect validation data in order to improve global land cover. To date we have collected more than 250,000 pixels (300m to 1km) of land cover and human impact, which have been used to validate maps of land availability for biofuels, and used in the development of hybrid land cover products, e.g. a global map of percent-

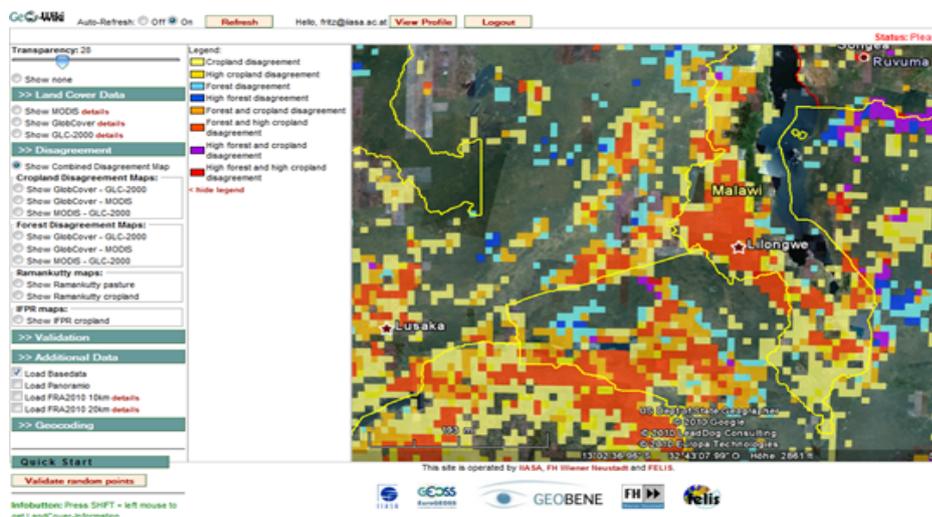


Figure 6: Interface of Geo-Wiki showing areas of disagreement between global land cover maps

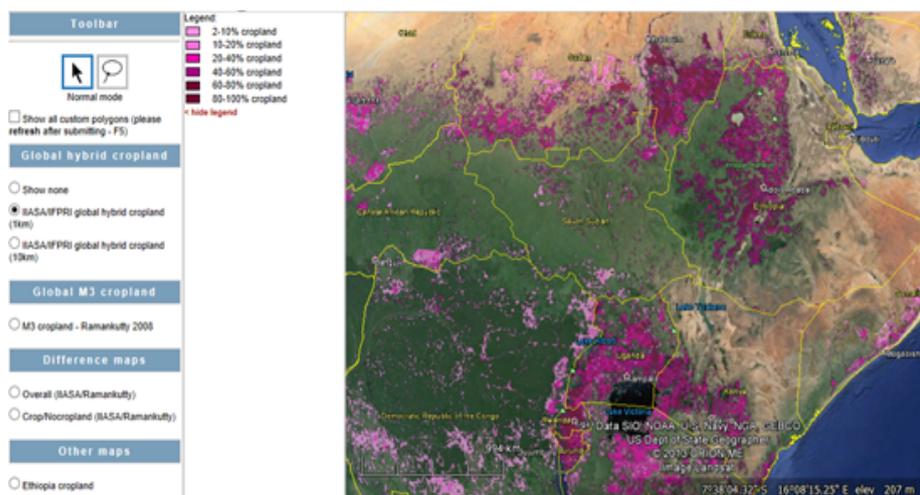


Figure 7: Interface of Geo-Wiki showing the global hybrid cropland map.

age cropland. This product is available from one of several Geo-Wiki branches for downloading and collection of user feedback on the product: <http://beta-hybrid.geo-wiki.org>.

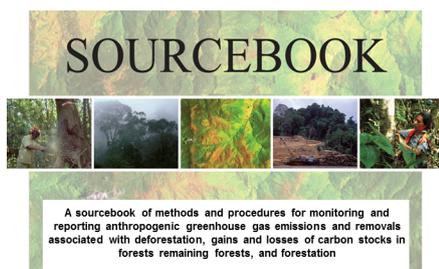
Other branches include a tool for comparing biomass datasets (<http://biomass.geo-wiki.org>), a branch for collecting information on urban morphology (<http://cities.geo-wiki.org>) and a site developed specifically for the Australian government to validate their land cover product (<http://auscover.geo-wiki.org>).

For more information about Geo-Wiki, recent publications and future competitions, register at: <http://www.geo-wiki.org> or email us at info@geo-wiki.org.

REDD+ training material with the World Bank

The GOFC-GOLD land cover project office has started the development of REDD+ training material in partnership with the World Bank.

The overall aim is to provide learning and teaching material to enable countries to develop capacities and implement REDD+ monitoring and reporting. These materials will be developed based on existing good practice guidance on REDD+ related forest monitoring;



in particular on technical material provided in the GOFC-GOLD Sourcebook. The training package will con-

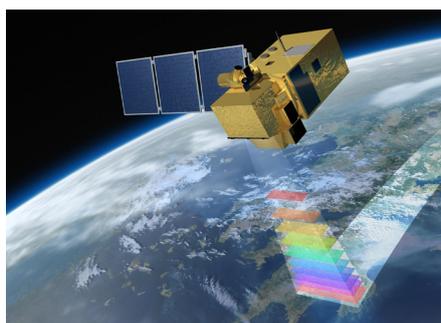
tain background lectures, country examples and practical exercises.

The material will be made available during spring 2014 on the website of the GOFC-GOLD land cover project office and through the World Bank FCPF website.

ESA Sentinel-2 Science Symposium

The European Space Agency (ESA) will organise a Science Symposium dedicated to the Sentinel-2 constellation on 20-22 May, 2014, in Frascati, Italy. Sessions will cover topics on land cover, forestry, and agriculture.

We will provide more information in the next newsletter and on our [Twitter](#) and [Facebook](#) accounts.



Note the ESA is intending to support the R&D activities of relevance for the Sentinel-2 mission with a collection of time series datasets from SPOT-4, Landsat-8 and RapidEye satellites over selected sites around the world. This data can be accessed along with more information on this project via this web page: <http://due.esrin.esa.int/s2t5.php>

Calendar of upcoming events

Event	Date	Venue	Information
UNFCCC Conference Of Parties 19	11-22 November 2013	Warsaw, Poland	http://www.cop19.org/
ESA Land Product Validation and Evolution on Land Products Workshop	28-30 January 2014	Frascati, Italy	http://congrexprojects.com/2014-events/13m49/introduction
Global Vegetation Monitoring and Modeling Conference	3-7 February 2014	Avignon, France	https://colloque.inra.fr/gv2m
Joint workshop of the EAR-SeL SIG LULC and the NASA LCLUC Science Team	17-18 March 2014	Berlin, Germany	https://www.geographie.hu-berlin.de/labs/geomatics/events/earsel-en/workshop
Global Land Project Open Science Meeting	19-21 March 2014	Berlin, Germany	http://www.glp-osm2014.org/
ESA Sentinel-2 Science Symposium	20-22 May 2014	Frascati, Italy	
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, USA	http://mri.scnatweb.ch/fair-and-workshop-on-mountain-observatories/home

Table 2: Upcoming events

Acknowledgements

The GOFC-GOLD LC PO wishes to thank Nandin-Erdene Tsendbazar (Wageningen U.) for the information provided on the GOFC-GOLD Global Land Cover Validation workshop, Steffen Fritz and Linda See (IIASA) for the material provided on the GEO-Wiki portal, Natasha Ribeiro for the material provided on the Miombo Network meeting, and Peng Gong for providing information on the GLC data portal from Tsinghua University, Beijing.

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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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Global Observation of Forest Cover and Land Dynamics



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