Newsletter N° 33| December 2015

LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

The GOFC-GOLD Land Cover Project Office takes the lead of the GFOI R&D Component

On October 1, the GOFC-GOLD Land Cover Project Office has taken the lead of the Research and Development Component of the Global Forest Observations Initiative (GFOI). The LC PO will coordinate the R&D activities until the end of 2016, with the support of the European Space Agency.

These new responsibilities reinforce the relationships between GOFC-GOLD and GFOI. Go to page 2 for more information on the planned activities.

Content

2015 GFOI Component Meetings

On March 2-6, Component Meetings of the Global Forest Observations Initiative (GFOI) was held in Sydney, Australia. Progress and next steps of the different Components were presented and discussed.

Some of the main discussion points were:

1- The Methods and Guidance documents (MGD) have proven to be a very useful GFOI product, and the development of version 2.0 is underway.

2- Several priority R&D topics were identified during the country discussions (e.g. accuracy assessment, transition areas, biomass estimation, sensor interoperability) and the need for high-resolution imagery for some specific applications was highlighted.

3- Good progress was reported across the four components of GFOI (MGD, Space Data, Capacity Building, and R&D), and a consistent theme was the need for a coherent approach to country engagement, delivered via the Capacity Building component and GFOI partners like SilvaCarbon and FAO.

5- The governance of, and resources to support the R&D component remains an issue. to be addressed by the Leads. It was agreed that closer alignment with GOFC-GOLD would be positive (see highlight article of this newsletter for more information).

6- The R&D component has delivered three workshops to date, with a fourth proposed in October 2015 (GLC map product for NFMS). It has developed an R&D component plan, and a supporting satellite data acquisition strategy.

7- Partner contributions remain a strength of GFOI, with several countries (USA, Norway, Australia, Germany, and the UK) and organisations (FAO, CEOS, Clinton Climate Initiative, and the World Bank) aligning significant elements of their programs.

8- The Space Data component (via CEOS and SDCG) has assured baseline coverage for 67 countries as of 2015, and with capacity being added this year global baseline coverage is expected to be realised in 2016.

9- A suite of Space Data Services are being developed by the Space Data

component with the objective of providing tailored national services, and addressing the barriers to the access and utilisation of satellite data sets.
10- Work on several "cloud computing" activities (i.e. SDMS, Data Cube) may offer solutions to some of the satellite data handling challenges faced by countries. Collaboration between CEOS and FAO, and individual progress by both groups, has started to pilot capabilities. See the Kenyan SLEEK program as an example..
12- It was agreed that the GFOI component meeting should become a regular fixture on the GFOI calendar, and offers a great opportunity to progress issues across all GFOI activities.

Summary reports of the meeting and planned actions are available on this page.

GOFC-GOLD Land Cover Office Leads GFOI R&D Component activities

From October 1, 2015, the GOFC-GOLD Land COver Project Office has taken the lead of the the Research and Development Component of the Global Forest Observations Initiative (GFOI). The LC PO will coordinate the R&D activities until the end of 2016, with the support of the European Space Agency.
GOFC-GOLD has been involved for several years in the activities of the GFOI (Method and Guidance Document, Capacity Development, R&D), and those from the GEO Forest Carbon Tracking Task, previously. This new role for GOFC-GOLD will strengthen further the relationship between the two institutions.
The Lead Office (LO) will be operated by Dr. Brice Mora under the supervision of Prof. Martin Herold, with the support of Erika Romijn, on the campus of Wageningen U., The Netherlands. Dr Ake Rosenqvist (SoloEO), and Dr Anthea Mitchell (University of New South Wales, Australia) who have been involved in the coordination of the GFOI R&D Component for a few years already, will keep playing a key role in the activities of the Component.
Some of the key objectives to be achieved during this period include:
- Support to the development of the SDCG Element-3 Strategy.
- Identification of R&D needs/issues in collaboration with the Method and Guidance Document (MGD) component.
- Ensure complementarity between the GOFC-GOLD REDD Sourcebook and the MGD.
- Organization of Expert Workshops on highest research priorities.
- Contribution to the organisation of capacity building Workshops.

Visit the website of the GFOI for more information.

Continued Investments Needed to Further Improve National Forest Monitoring and Reporting Capacities of Tropical Countries

With the official launch of the Global Forest Resources Assessment (FRA) on Monday 7 September at the World Forestry Congress in Durban a special journal volume of Forest Ecology and Management was released which served as the primary analytical venue for FRA 2015.
Erika Romijn and Martin Herold from the Laboratory of Geo-Information Science and Remote Sensing at Wageningen University, in close collaboration with Celso Lantican (Green Tropics International), Erik Lindquist (UN-FAO), Robert Ochieng (Forest and Nature Conservation Policy Group, Wageningen University), Arief Wijaya (CIFOR), Daniel Murdiyarso (CIFOR and Bogor Agricultural University) and Louis Verchot (CIFOR) contributed to this volume by performing a study on assessing change in national forest monitoring capacities of 99 tropical countries*. Their article gives an overview of the current national forest monitoring and reporting capacities and recent changes for the years 2005-2010-2015 in 99 tropical countries, using the FAO FRA data as a basis.
Especially in the tropics where forests are declining at a rapid rate, national forest monitoring systems capable of reliably estimating forest cover, forest cover change and carbon stock change are of vital importance. As a large number of tropical countries had limited capacity in the past to implement such a system, capacity building efforts have been ongoing to strengthen the technical and political skillsets necessary to implement national forest monitoring at institutional levels.
The study shows that countries' capacities to monitor forest area and area changes with use of remote sensing data improved considerably between 2005 and 2015 and now a larger area is monitored with good to very good ca-

pacities. This effect is related to more free and open remote sensing data and availability of techniques to improve forest area change monitoring. Countries' capabilities to perform forest inventories also increased significantly (Figure 1). Carbon pool reporting still needs to be improved with greater emphasis on producing accurate emission factors at Tier 2 or Tier 3 level.

The results emphasized important progress and level effectiveness of capacity building programmes (such as those by FAO and REDD+ readiness) but also the need for continued capacity development efforts. These will further improve accuracy and reliability of data and information on forest resources which is needed to refine policies and decisions and to further improve forest management and reduce forest loss in tropical countries.

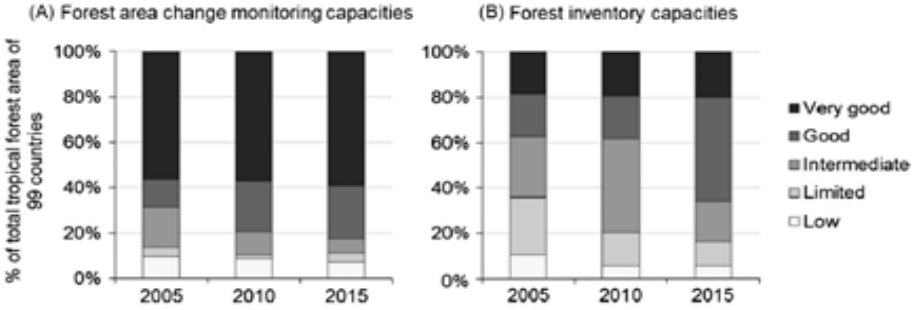


Figure 1: Percentage of total tropical forest area of the 99 countries that is monitored with "low", "limited", "intermediate", "good" or "very good" forest area change monitoring and remote sensing capacities (A) and forest inventory capacities (B) in the assessment years 2005,2010 and 2015. Source: Romijn et al., 2015

* Romijn, J.E., Lantican, C.B., Herold, M., Lindquist, E., Ochieng, R., Wijaya, A., Murdiyarso, D., Verchot, L., 2015. Assessing change in national forest monitoring capacities of 99 tropical countries. Forest Ecology and Management, 352 (Special Issue: Changes in Global Forest Resources from 1990 to 2015), pp.109-123.

Annual net AFOLU emissions in the tropics (2000-2005)

According to the most recent Intergovernmental Panel on Climate Change (IPCC) Assessment Report on Climate Change (Fifth Assessment Report), the global greenhouse gas (GHG) emissions must be cut by 41-72% below 2010 levels by 2050 for a likely chance of limiting the increase in global mean temperature to 2°C (Smith et al. 2014). To achieve this ambitious mitigation target, effective action is required from all the emission sectors, all activities and all gases. The AFOLU sector (Agriculture, Forestry and Other Land Use) roughly contributes with about a quarter (~ 10 – 12 PgCO2e. yr-1) of the net anthropogenic GHG emissions mainly from deforestation, agricultural emissions from soil and nutrient management and livestock, and hence is an important sector for mitigation action.

To help prioritize mitigation action and investments in the AFOLU sector, an on-going study lead by CIFOR-Wageningen University-Karlsruhe Institute of Technology is looking for the spatial distribution of emissions hotspots at 0.5° degrees, in the tropics, for the period 2000-2005. These hotspots correspond to areas where agriculture (cropland soils + livestock) and forests (deforestation and degradation) emit the most, and therefore they hold larger mitigation potentials (without technical nor economic considerations). The produced maps are useful to countries with little data or technical capacity, and serve as benchmarks against which countries can assess their performance in mitigating land use and land cover change emissions. The hotspots data set will be made available once the research undergoes the peer-review process, but preliminary results can be obtained online.

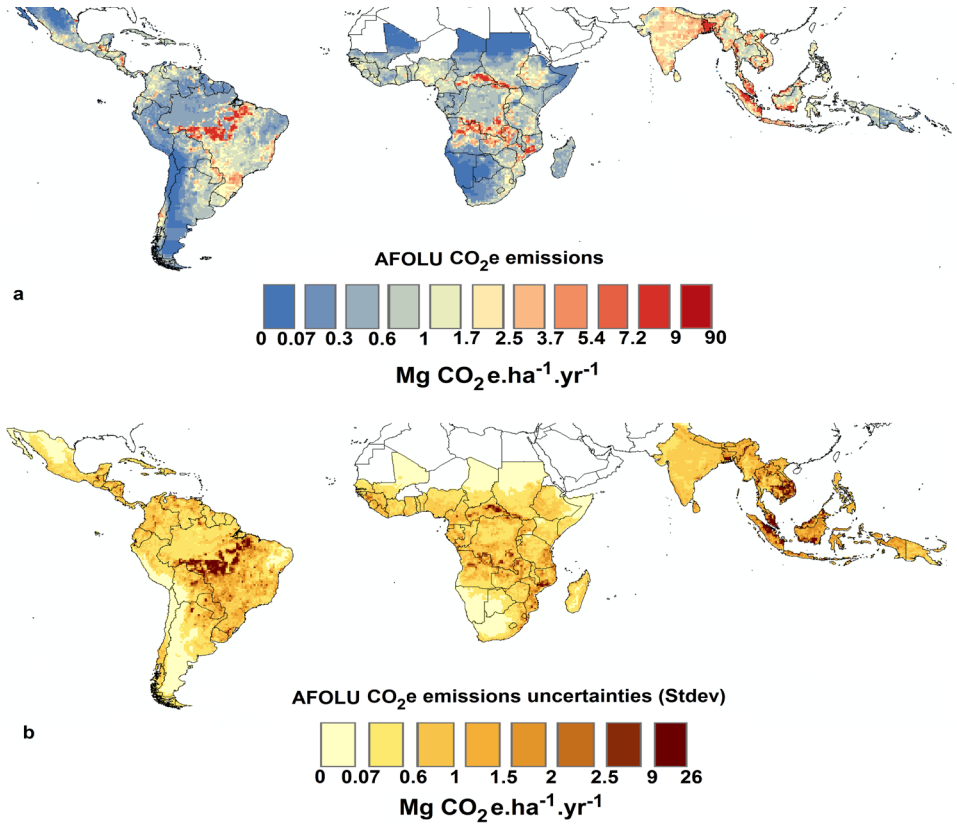


Figure 2: (a) Hotspots of annual AFOLU emissions and (b) associated uncertainties (stdev) in MgCO2e. ha.-1.yr-1 for the tropical region, for the period 2000-2005, at 0.5°resolution. Emissions are the result of 1000 Monte Carlo simulations for the leading AFOLU emission sources (deforestation, degradation (fire, wood harvesting), soils (crops, paddy rice), livestock (enteric fermentation and manure management)

LACO-Wiki: Software Tool for Land Cover Validation

LACO-Wiki is an online solution for land cover and land cover change map validation in local, regional to continental scales and available to the whole EO community. LACO-Wiki is a joint development by IIASA and GeoVille Group and targets the demand for the standardized validation of a steadily growing amount of satellite-based land cover information produced on the basis of new Earth Observation missions (such as the upcoming European Sentinel-2). In this context, LACO-Wiki strictly adheres to the *GEO Quality Assurance Framework for Earth Observation (QA4EO)* principles of transparency, traceability, independence, accessibility and representativeness.

LACO-Wiki will be released by the end of October 2015. In the meanwhile, please visit http://www.laco-wiki.net/en/Welcome and watch our latest demo video. You can also register to get the latest updates by mail.

The LACO-Wiki system will contribute to a more coherent Earth Observation-based land monitoring approach. LACO-Wiki development has taken the operational requirements from stakeholders in European land monitoring (e.g. the European Environment Agency in the frame of Copernicus) into account, but is also considering the needs of the full range of users who have a demand for standardized validation in the context of national and regional land information systems as well as operational land monitoring projects across the globe. Moreover, LACO-Wiki will be a valuable tool for educational purposes, e.g. students will be able to access the tool to validate their own land cover products or the tool could be embedded within remote sensing courses.

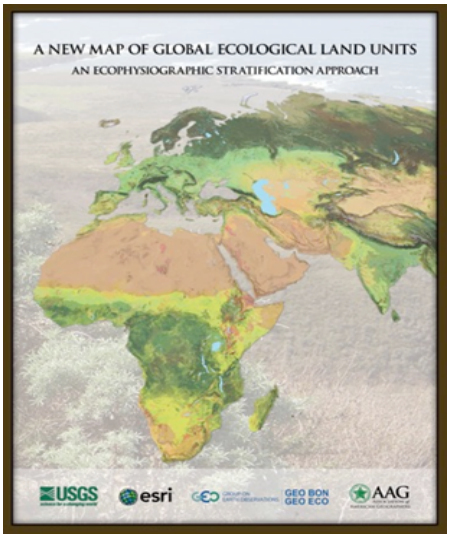
The outcomes of the LACO-Wiki project will be:

- an open access online validation platform offering standardised and extended validation functionality for the validation of regional, national and global land cover data
- an openly accessible repository of calibration and validation data and maps, systematically enlarged by the user community through crowdsourcing
- a sharing platform for building a thriving land cover validation community that will engage organisations such as the European Environment Agency and related networks (EIONET, EAGLE), universities, national agencies, commercial service providers and international initiatives, such as GOFC-GOLD and the Group on Earth Observations (GEO).

Figure 3: Interface of the LACO-Wiki tool

A New Map of Global Ecological Land Units – An Ecophysiographic Stratification Approach

GEO BON Implementation Committee member Dr. Roger Sayre, of the U.S. Geological Survey writes: The United States Geological Survey (USGS) and Esri have collaborated to produce a new, high resolution global ecosystems map. The Association of American Geographers (AAG) has published a print version of the paper describing the work – A New Map of Global Ecological Land Units –An Ecophysiographic Stratification Approach. The paper can be found at http://rmgsc.cr.usgs.gov/ecosystems/pubs.shtml (USGS). This document contains the maps and also describes the concepts and methods for delineating Ecological Land Units (ELUs) as distinct physical environments and associated land cover. The mapping approach first characterizes the climate regime, the landforms, the geology, and the land cover of the Earth, and then models terrestrial ELUs as a combination of those four land surface characteristics. The document contains detailed and accurate maps of ELUs for the Earth and



the continents, as well as regional examples. The global map of nearly 4000 ELUs has a 250-meter spatial resolution.
This work was commissioned by GEO as ECO-01-C1, and has been "cross listed" as a GEO BON deliverable since its inception. The products (publication, map, data, and browser/tour apps) were announced and launched at the ACES (A Community for Ecosystem Services) 2014 Conference last September by Secretary of the Interior Sally Jewell as part of the President's Climate Data Initiative for Ecosystem Vulnerability. They have since been showcased at the Esri Federal Users Conference, the Association of American Geographers (AAG) Annual Meeting, and an Experts Forum of the United Nations System of Environment-Economic Accounting (UN SEEA). They will also be featured at the upcoming Esri International Users Conference, the second Eye On Earth Summit in Abu Dhabi, and the Group On Earth Observations (GEO) Plenary and Ministerial Meeting in Mexico City.

The data are available for ftp download in the public domain, or as ArcGIS Online (AGOL) content. In AGOL, the data are streamed for web mapping and analysis, and can be integrated and leveraged with a number of human and environmental data layers from Esri's Living Atlas.

Calendar of Upcoming Events

Event	Date	Venue	Information
GFOI Open Forum	February 23-24 2016	Frascati, Italy	http://www.gfoi.org/meetings/
Global Climate Observation: the Road to the Future	March 2-4 2016	Amsterdam, The Netherlands	http://www.gcos-science.org/
2nd EARSeL LULC/ NASA LCLUC Workshop	May 6-7 2016	Prague, Czech Republic	http://www.earsel.org/workshops/2016-SIG-LULC-Prague/
ESA Living Planet Symposium	May 9-13 2016	Prague, Czech Republic	http://lps16.esa.int/
2016 GEO BON Open Science Conference	July 4-9 2016	Leipzig, Germany	http:http://conf2016.geobon.org/

Table 1: Upcoming events

Acknowledgements

The GOFC-GOLD LC PO thanks Roger Sayre (USGS) for providing information on the New Map of Global Ecological Land Units Product, Erika Romijn for providing information on the country capacity assessment for NFMS, Rosa Maria Roman Cuesta (Wageningen U.) for providing information on the AFOLU emission study, and Linda SEE (IIASA) for providing information on the LACO-Wiki project.

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

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