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LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

GFOI R&D session at GEO GEPW-10 meeting

The R&D Coordination component of the GFOI organized a session on ongoing activities of the participating R&D groups at the GEPW-10 meeting, held in Berlin, Germany (31 May - 2 June, 2016).

The session was an opportunity to present R&D activities of the GFOI but also to discuss the key contributions of European research to tropical forest monitoring.



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GOFC-GOLD / World Bank FCPF Training the Trainers Workshops

The GOFC-GOLD Land Cover Project Office continues the organization of REDD+ training workshops in partnership with the World Bank FCPF, the FAO, SilvaCarbon, and the GFOI.

The performance-based climate mitigation framework REDD+ encourages the reduction of emissions related to deforestation and forest degradation, and removals through enhanced forest carbon stocks and improved forest management. In this context, measurement and reporting activities require methodologies for estimating actual emissions and removals and for establishing reference levels. UNFCCC requests countries to build robust and transparent national forest monitoring systems to facilitate the measurement and reporting of forest related greenhouse gas (GHG) emis-

sions, following the guidelines and guidance from the Intergovernmental Panel on Climate Change (IPCC). Various training materials and tools, such as those from GOFC-GOLD, the WB FCPF, GFOI, FAO UN-REDD Programme, Silvacarbon, and R&D partners such as Boston University and Wageningen University are available.

To make these materials more accessible for countries and REDD+ / forest monitoring professionals, regional one-week workshops are planned and organized in three different continents: one in South-East Asia (in English), one in Latin America (in Spanish) and two in Africa (in French and English). The basic concept of these workshops is to "train the trainers".

A selected group of around 35 participants from countries in each region

(2-3 per country) attends with the aim of further disseminating the gained knowledge and insights and train other relevant people who are involved in REDD+ monitoring and reporting in their country, in order to further build their capacities.

Three training workshops have been organized so far in Thailand, Peru, and Ethiopia. Training materials these workshops are partially based on, and workshop summaries are accessible from this page:

www.gofcgold.wur.nl/redd/Training_materials.php. See bottom of the page for summaries.

Workshop summaries also provide links to other training materials developed by our partners.

GOFC-GOLD / GEO BON Biodiversity Sourcebook

In coordination with the Biodiversity Observation Network of the Group on Earth Observations (GEO BON), the GOFC-GOLD Land Cover Project Office has been developing a sourcebook of methods and procedures for monitoring essential biodiversity variables in tropical forests with remote sensing.

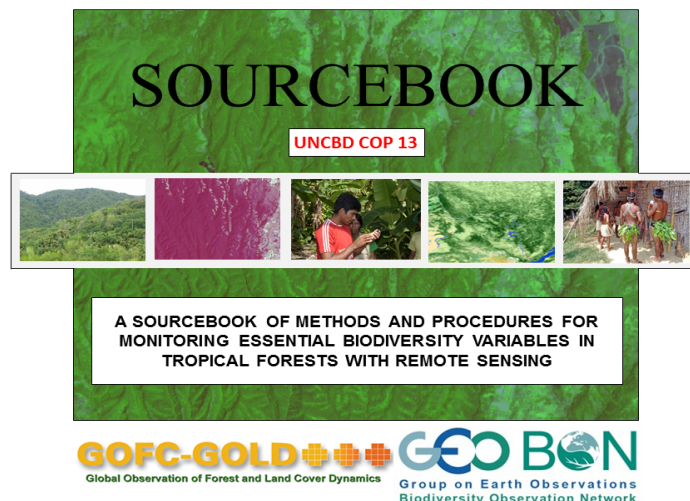
The development of the sourcebook relies on the contributions from more than 50 authors specializing in remote sensing, environment monitoring, tropical forest, biodiversity monitoring, and conservation.

The sourcebook will be officially released during the next Conference of Parties of the United Nations Convention on Biological Diversity (UN CBD COP-13) to be held on 4-7 December, 2016, in Cancun, Mexico.

The sourcebook will be a peer-re-

viewed living document, i.e., regularly updated to report on the evolution of the policy context, the Essential Biodiversity Variables (EBVs) relevant to tropical forests, the scientific and technical developments.

The sourcebook will be made freely available in December from the GOFC-GOLD Land Cover Project Office and the GEO BON websites.



GFOI R&D Session at GEO GEPW-10 Meeting

The R&D Coordination component of the GFOI organized a session on ongoing activities of the R&D groups at the GEPW-10 meeting, held in Berlin, Germany (31 May - 2 June, 2016).

To help fulfilling the needs arising from the climate change mitigation efforts, the Global Forest Observations Initiative (GFOI) of the Group on Earth Observations (GEO) fosters actions toward operational national forest monitoring systems (NFMS) that can support REDD+ Monitoring, Reporting, and Verification activities in tropical regions.

The session presented the capacities of the GFOI to identify and respond to country needs, facilitating data access, coordinating R&D activities, but also providing methodological guidance to countries for the implementation of NFMS in compliance with the UNFCCC decisions, and the IPCC guidelines.

The session showcased also an initia-

tive from the Copernicus Programme to demonstrate how European funded R&D can help meeting the international policy requirements in relation to climate change, and provide support to the GEO's societal benefit areas.

Some R&D groups reported on recent progress in the domain of satellite data integration and processing techniques that is supported by the GFOI, space agencies, and the private sector.

We concluded that 1) Europe is a major contributor to REDD+ activities (with Germany, Norway, UK), and will be a primary EO data provider with the Copernicus Programme and the BIOMASS mission, 2) Europe has a strong

position in R&D for REDD+, via GFOI notably but generally in forest science, 3) GFOI is a flagship project of GEO with long history, strong partnerships, and achievements whose impact can be observed in developing countries, and 4) Europe can strengthen its leadership on REDD+ MRV, further contributing to GFOI R&D activities for improved MRV systems, notably through the design of national and European research calls.

Presentations of the sessions are available online [from this page](#) (look for session #4 on Tuesday afternoon in the agenda).



Figure 1: Participants of the GEPW-10 meeting.

Get to the point with Forestry Thematic Exploitation Platform

The Forestry Thematic Exploitation Platform vision is of a one-stop shop for forestry remote sensing services for both the academic and commercial sectors.

The Sentinel satellites of the European Copernicus program have started to provide unprecedented data volumes to anyone interested free of charge. Operational Copernicus data supply will continue for decades to come. Downloading such data by each individual and analysing them in-house with miscellaneous tools is time consuming and impractical. Taking the full benefit of the data masses requires more streamlined approaches. Forestry-TEP aims at responding to the emerged need on more effective information retrieval. Forestry-TEP will provide remote access to pre-processed Copernicus and other satellite data, ancillary data and third party data, together with computing resources and tools to process and analyse them. Users are able to produce data products of interest without having to download the source data, which can be tens of gigabytes per image. The Forestry-TEP also aims to be a place to find information about what is happening in forestry earth observation globally and a place to network and discuss this with colleagues. Forestry-TEP will provide free access with free software tools and data to everyone interested, as well as added-value services and data. It will also offer a self-service environment for the users to develop their

own tools and services. This will drastically reduce the burden on data acquisition from miscellaneous sources with varying formats and processing levels. Data integrity and security issues are duly considered.

Easy to use push-button functionalities can provide simple value added products such as vegetation indices. They also aim at lowering the threshold for the utilization of Earth observation data for the less experienced users.

Furthermore the Forestry-TEP Platform will offer access to commercial software and services. Our aim is to evolve the Platform and introduce this in the marketplace, offering services provided by the European value adding SME's.

The identified users groups include Copernicus core services, UN-REDD and other international programs such as the Global Forest Observation Initiative (GFOI), national forest inventories, universities and research centers, forest managers, forest industry, value adding industry, land use planning and nature conservation agencies, and sustainable development NGO's.

Two extensive pilots are being conducted in 2016-2017: one for Mexico

on carbon monitoring for climate change reporting and another in Finland on operational forest management.

The platform will be opened to two pilot users during fall 2016 and to a wider user community in March 2017. The Forestry-TEP project is funded by the European Space Agency and it is coordinated by VTT Technical Research Centre of Finland Ltd. The system integrator is CGI (UK) and the two additional partners, Arbonaut (FI) and Spacebel (B) represent value adding industry.

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Figure 2: Enthusiastic foresters in Forestry-TEP field trip in Mexico

ECOPOTENTIAL a European Project on Use of EO Data to Monitor Ecosystem Services & Study Geosphere-Biosphere Interactions

Ecosystems are the product of the interaction between living organisms and the physical, chemical and geological environment; they are complex systems whose dynamics are driven by the fluxes of energy, matter and information among biosphere, soil, oceans and atmosphere. Natural ecosystems provide essential benefits and services such as clean water, clean air, food, raw materials, slope stability, flood mitigation and

greenhouse gas storage. Ecosystems are life-support systems for plants and animals and, in the end, for humankind, allowing also the development of economically-relevant activities.

In the last decades, however, pollution, land use changes, the introduction of invasive species and climate changes induced a strong stress on natural ecosystems, diminishing the quality of ecosystem services and their provision. In order to contrast this trend, we need



to develop new conservation strategies based on the knowledge of the functioning and changes of ecosystems and of the pressures that act on them, using available data and building models capable to represent the complex interactions that link living organisms with the environment, from local to continental scales.

This is the conceptual framework of the European H2020 project “ECOPOTENTIAL: Improving future ecosystem benefits through Earth Observations”. This four-year-long project, started in 2015, involves 47 partners and 23 protected areas and it aims at making best use of in situ data and remote-sensing observations (especially Copernicus Sentinel data) for monitoring and modelling terrestrial and marine ecosystems, with a special focus on the integration of satellite data in forecasting models and a strong multidisciplinary approach. Of course, the long term monitoring of land cover changes is of paramount importance for the project achievements.

ECOPOTENTIAL activities and pilot actions are focused on a targeted set of diverse, internationally recognised protected areas (PA) from Europe, European Territories and beyond, covering most of Europe's biogeographic regions, and focusing on mountain, arid and semi-arid, coastal and marine ecosystems. This choice has been made considering that many protected areas still include relatively undisturbed ecosystems, and they are able to provide ecosystem services that are not available elsewhere. Moreover, many data and studies available from protected areas are ready to be used and com-

bined with the information provided by satellite observations.

Building on the knowledge gained in individual PAs, ECOPOTENTIAL will address cross-scale ecological interactions and landscape-ecosystem dynamics at regional to continental scales. ECOPOTENTIAL will address the entire chain of ecosystem-related services, by developing and implementing new open access products and tools, made available on open platforms coherent with the Global Earth Observation System of Systems (GEOSS) data sharing principles and based on the combined use of satellite data, in situ data and numerical models, aimed to quantify and predict the state and the evolution of natural ecosystems as (a) ecosystem data services, with special emphasis on Copernicus services; (b) model output services for distributing the results of the modelling activities; and (c) estimates of the current and future state of ecosystem services and benefits, combining ecosystem functions (supply)

with beneficiaries needs (demand). This array of tools and products will allow the development of improved management and conservation strategies. The presence of UNESCO and UNEP as partners of the project will allow the project to define guidelines for a sustainable and responsible management of ecosystems at global level, setting the quality standards for future protected areas.

Coordinator: Antonello Provenza, Institute of Geoscience and Earth Resources, National Council of Research, Italy

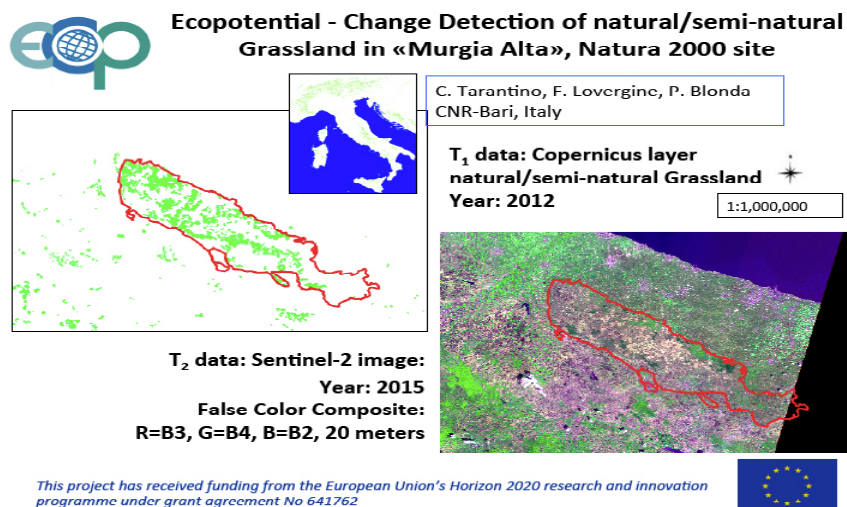
Websites: www.ecopotential-project.eu/
<http://ecopotential-newsletter.igg.cnr.it/>

Facebook: EcoPotentialProject

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Ecopotential is funded by the EU under the grant agreement 641762.



New Tools and Systems to Estimate Land-Sector Emissions

As more countries develop systems for Measurement, Reporting and Verification (MRV) it is becoming clear that there are very few tools that can effectively integrate the volume and range of remote sensing and ground data currently being collected to produce estimates of greenhouse gas emissions and removals. This is particularly the case as countries move beyond reporting of past emissions, and seek to conduct analyses of land-sector

mitigation analyses to achieve their Nationally Determined Contributions (NDC) of emission reduction targets. And once mitigation actions are implemented, countries have a need for verifiable and transparent estimates of emission reductions to access results-based payments for climate services. With many countries planning to include the land sector in their efforts to mitigate emissions and with a rapid increase in earth observation data, the need for integrating systems has

never been greater.

The Full Lands Integration Tool (FLINT) is a second-generation integration tool designed to combine remote sensing, ground data and other information to estimate land-sector emissions. The FLINT builds on the experience and expertise gained from the development of Australia's Full Carbon Accounting Model (Full-CAM) [1], Canada's Carbon Budget Model for the Canadian Forest Sec-

tor (CBM-CFS3)[2] and Kenya's System for Land-based Emissions Estimation for Kenya (SLEEK) [3]. The FLINT is a modular tool that manages the complex tasks of data processing and analysis. The modular structure provides a high degree of flexibility to build country-specific implementations using existing modules or countries can develop and easily attach their own modules. The FLINT supports analysis using a range of approaches and degrees of complexity (from IPCC Approaches 1 to 3 and Tiers 1 to Tier 3). This allows countries to more easily build continuous improvement into their MRV design, starting simple and increasing complexity as data and expertise permit without having to change the core system. Country-specific implementations built on the FLINT platform have been tested in Kenya (SLEEK), Canada (GCBM) and Mexico (GCBM).

But simply having software tools is not enough. For the FLINT and other MRV-related open-source tools to operate effectively, they must be supported by a professional management and administrative structure. Too often software has been developed as part of donor-supported projects only to be lost shortly after funding ceases. Sustainable tools, such as the Global Earthquake Model [4], have been supported through

organisations with clear governance structures and the support of users from multiple countries.

A new professional organisation, moja global, will support the FLINT open-source tools accessible to countries to develop and operate their land sector and greenhouse gas inventories. This arrangement will provide confidence that the system is not only advanced and cost-effective, but that it will be maintained and supported in the long term. moja global is being established under the Linux Foundation, a world leader in the management and support of open source software.

For more information see <http://moja.global>.

moja.global or contact us at info@moja.global.

[1] See <https://www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector>

[2] See <http://www.nrcan.gc.ca/forests/climate-change/carbon-accounting/13107>

[3] See <http://www.sleek.environment.go.ke/>

[4] See <https://gcn.com/articles/2010/11/03/global-earthquake-model.aspx>

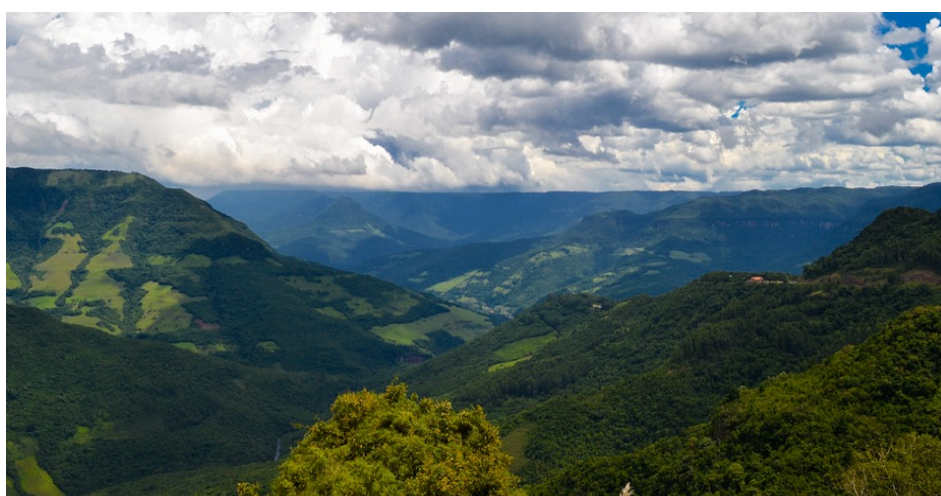


Figure 3: Atlantic forest in Brazil (illustration)

WorldCover Conference 2017

The European Space Agency, together with GEO, FAO and EU are organising the WorldCover 2017 Conference. It will be held at ESA/ESRIN, Frascati, Italy, between 14-16 March 2017.

The conference will give scientists and users the opportunity to present first-hand, up-to-date results from their research and application development activities - by using data from past and current satellites. The outcome of the conference will help further shape the next generation of R&D activities of ESA Earth Observation programmes.

The main objectives of the conference are:

- Listen and capture multi-user re-

quirements (climate modellers, geographers, scientists, environmentalists) for high and low resolution land cover mapping;

- Head towards the development of a sustainable operational system for land cover classifications to meet user's needs;

- Follow on previous successful global-scale mapping experiences;

- Produce a set of recommendations for funding and implementation agencies;

- Establish a set of research and devel-

opment activities, to meet user requirements.

For further details and to submit your abstract, please visit [the conference website](#).

The deadline for abstract submissions is 6 December 2016.



Calendar of Upcoming Events

Event	Date	Venue	Information
Global Land Project 3rd Open Science Meeting	October, 24-27 2016	Beijing, China	www.globallandproject.org/glp_events/open_science_meeting
GOFC-GOLD LC / GFOI R&D Science meeting	October, 31-November 4 2016	The Hague, The Netherlands	www.gofcgold.wur.nl/sites/gofcgold-gfoi_sciencemeeting2016
UNFCCC COP-22	November, 7-18 2016	Marrakech, Morocco	http://unfccc.int/
UNCBD COP-13	December, 4-17 2016	Cancun, Mexico	https://www.cbd.int/
Remote Sensing of Fluorescence, Photosynthesis, and Vegetation Status	January, 17-19 2017	Frascati, Italy	http://www.flex2017.org/
WorldCover 2017 Conference	March, 14-16 2017	Frascati, Italy	worldcover2017.esa.int

Table 1: Upcoming events

Acknowledgements

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