Report of the Workshop on Monitoring Tropical Deforestation and Degradation (REDD)

as part of the
Third GOFC-GOLD Land Cover Symposium

Friedrich-Schiller University
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Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) is a coordinated international effort to ensure a continuous program of space-based and in situ forest and other land cover observations to better understand global change, to support international assessments and environmental treaties and to contribute to natural resources management.

GOFC-GOLD encourages countries to increase their ability to measure and track forest and land cover dynamics by promoting and supporting participation on implementation teams and in regional networks. Through these forums, data users and providers share information to improve understanding of user requirements and product quality.

GOFC-GOLD is a Panel of the Global Terrestrial Observing System (GTOS), sponsored by FAO, UNESCO, WMO, ICSU and UNEP. The GOFC-GOLD Secretariat is hosted by Canada and supported by the Canadian Space Agency and Natural Resources Canada. Other contributing agencies include NASA, ESA, START and JRC. Further information can be obtained at http://www.fao.org/gtos/gofc-gold

Executive summary

Organized and hosted by the GOFC-GOLD Land Cover Project Office, the workshop on "Reducing Emissions from Deforestation and Degradation" (REDD) was held on October 13th 2008 at the University Jena, as a part of the 3rd GOFC-GOLD Land Cover Symposium (13-17 October 2008). An international group of more than 50 scientists attended the meeting, including; members of the GOFC-GOLD REDD working group, experts in the field of earth observation and tropical forest cover, and representatives from international organizations such as FAO, the UNFCCC secretariat, the GEO secretariat and from national forest monitoring agencies. The workshop was a continuation of the GOFC-GOLD REDD workshops held in March 2006 (HEROLD et al. 2007a) in Germany and March 2007 in Bolivia (HEROLD et al. 2007b). The main goal of the workshop was to review the development progress of the GOFC-GOLD REDD technical sourcebook and to discuss in detail the outline and the inclusion of new topics, taking note of recent developments in the UNFCCC process.

Since its introduction to the UNFCCC in 2005, the REDD issue has become one of the main topics in the negotiations for an international Post-Kyoto Climate Agreement. The GOFC-GOLD Land Cover Implementation Team (LC-IT) has established a working group for REDD that has been continuously contributing to the UNFCCC process in terms of technical guidance since 2005. Following the need for technical advice for monitoring tropical forest change and estimation of carbon emissions in developing countries, the working group has started to develop a technical sourcebook. This sourcebook is designed to provide an overview of methods and procedures to monitor forest area changes and estimate related carbon stock changes and emissions (GOFC-GOLD, 2008). It is a living document, which is continuously updated in response to the reporting requirements of the UNFCCC. The current version was presented at UNFCCC COP-13 and SBSTA 28.

A recent UNFCCC REDD methodology meeting held in Tokyo (25-27 June 2008) has underlined the urgent need to increase the understanding of available methods for estimating and monitoring emission reductions from deforestation, forest degradation and carbon-stock changes, recognizing remote-sensing technologies (UNFCCC 2008, FCCC/SBSTA/2008/11). In response to this need, the working group has worked to further develop and adapt the content of the sourcebook. Thus, the workshop progressed on this issue by presenting and discussing the recent UNFCCC developments; elaborating on key challenging issues, formulating technical and methodological recommendations to support building national level REDD capabilities, and defining an action plan for the respective sourcebook update. The GOFC-GOLD REDD working group introduced the concepts and discussed the potential content of new chapters to be included in the sourcebook, which could include monitoring of forest regrowth, biomass burning, estimation of uncertainties, role of evolving technologies and carbon budget models. Further emphasis was put on the role of the Regional Networks and community-level involvement in the REDD monitoring and implementation.

The results of the workshop have been presented and summarized at the UNFCCC SBSTA expert meeting on monitoring forest degradation (Oct 2008), the GEO forest monitoring symposium (Nov. 2008) and at a dedicated side event at the UNFCCC COP-14 jointly organized and hosted by Papua New Guinea and GOFC-GOLD. The updated version of the sourcebook will be available for upcoming capacity development events, organized by the Coalition for Rainforest Nations with help from others (including GOFC-GOLD) with a relevant workshop on forest area change assessment scheduled for February 2009.

Table of contents

Acronyms

BOG	Breakout Group
COP	Conference of the Parties
CSIRO	Australian Commonwealth Scientific and Research Organization (CSIRO)
ESA	European Space Agency
FAO	Food and Agriculture Organization
Fire-IT	Fire Implementation Team
FFPRI	Forestry and Forest Products Research Institute (Japan)
GSE FM	GMES Service Element Forest Monitoring
GEO	Group on Earth Observation
GMES	Global Monitoring for Environment and Security
GOFC-GOLD	Global Observation of Forest Cover and Global Observation of Land Dynamics
GTOS	Global Terrestrial Observing System
ICSU	International Council for Science
IFCI	International Forest Carbon Initiative
IPCC	Intergovernmental Panel on Climate Change
ITC	International Institute for Geo-Information Science and Earth Observation
LC-IT	Land Cover Implementation Team
LIDAR	Light Detection and Ranging
NASA	National Aeronautics and Space Administration
PO	Project Office
REDD	Reducing Emissions from Deforestation and forest Degradation
RN	Regional Network
SAR	Synthetic Aperture Radar
SBSTA	Subsidiary Body for Scientific and Technical Advice
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USGS	United States Geological Service
WMO	World Meteorological Service

1 Background and objectives

Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) is a coordinated international effort to ensure a continuous program of space-based and in situ forest and land cover observations to; better understand global change, to support international assessments and environmental treaties and to contribute to natural resources management. GOFC-GOLD encourages countries to increase their ability to measure and track forest and land cover dynamics by promoting and supporting participation on implementation teams and in regional networks. Through these forums, data users and providers share information to improve understanding of user requirements and product quality. GOFC-GOLD is a panel of the Global Terrestrial Observing System (GTOS), sponsored by FAO, UNESCO, WMO, ICSU and UNEP.

The GOFC-GOLD REDD working group was established in 2005 and is comprised of international experts in earth observation for deforestation and forest disturbance monitoring. The goal is to promote satellite monitoring as an objective and efficient approach for monitoring deforestation in developing countries and to provide technical guidance on current and future capabilities. There is a strong need for such an independent advisory group to develop international consensus among the experts involved in earth observation and to foster the implementation of related activities. International cooperation and communication is ensured through the GOFC-GOLD land cover team involving international actors and scientists in earth observation and deforestation assessment, experts and representatives from national level institutions in developing countries, and related organizations such as NGO's and UN bodies.

The various activities and interactions of the working group to the UNFCCC political process is illustrated in figure 1.

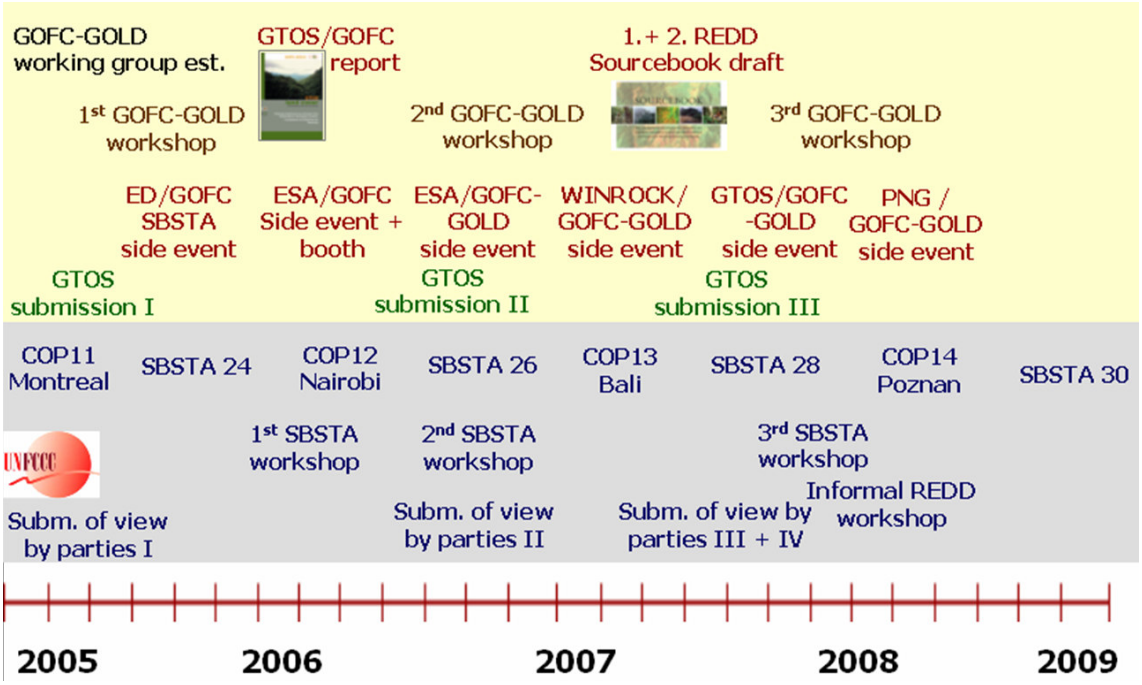

Figure 1: Activities of the GOFC-GOLD REDD Working Group since 2005

As an outcome of a workshop held in March 2006, the group completed the first technical document to show that forest changes can be monitored with confidence for assessing and comparing historical and future rates of deforestation (DeFries et al. 2006). In response to the need for more detailed guidance on methods and techniques for monitoring forest changes and estimate the related carbon stocks and GHG emissions, the working group started to develop the GOFC-GOLD REDD Sourcebook. The book is designed to build capacity for national forest monitoring systems and UNFCCC reporting to specifically address developing countries. The sourcebook is currently under revision for version 2, which is will be presented at SBSTA-30. Following recent developments in the UNFCCC process, several new chapters and topics will be included in the 2nd version.

The workshop was organized to inform the participants about the developments, and to organize the update within the team. It had the following specific objectives:

- Present and discuss UNFCCC developments and evolving requirements for monitoring forest carbon changes in developing countries (session 1)
- Outline developments and discuss contributions of GOFC-GOLD to related international activities and processes (UNFCCC, UN-REDD, GEO, IPCC, etc.) (session 1)
- Discuss key challenging issues and formulate technical and methodological recommendations to support building national level REDD capabilities, data collection and develop national implementation strategies (session 2, breakout group discussions, accuracy assessment w/s)
- Action plan for sourcebook update (session 2, breakout group discussions)

2 Participants

The workshop brought together up to 50 recognized scientists and experts in the field of earth observation and tropical forest cover. Participants included GOFC-GOLD LC-IT members, representatives from developing countries, scientists from research institutions, technical experts from non-governmental organizations or private companies, and representatives from space agencies. Appendix A provides the complete participants list.

3 Agenda

The workshop included both presentations and breakout group discussions. The presentations were organized in two sessions:

- Introduction and requirements
- New sourcebook chapters and critical issues

The breakout group discussions focused on the further development of the GOFC-GOLD REDD sourcebook in order to discuss the major points to add into, to provide some initial text and to define who will contribute to the individual chapters:

- Forest degradation and regrowth (Chair: Achard/DeFries)
- Biomass burning (Chair: Justice)
- Evolving technologies (Chair: Held)
- Data collection at local/national level (Chair: Van Laake/Mayaux)

A detailed agenda is included in Appendix B. With permission of the speakers all presentations of the workshop are available as a PDF on the GOFC-GOLD PO website under: http://www.gofc-gold.uni-jena.de/sites/Jena08_13oct_A.php.

In a parallel poster session, REDD case studies were presented. The complete list is attached in Appendix C.

4 Summary of presentations and discussed topics

Session 1: Introduction and requirements

Martin Herold (LC-IT) opened the workshop with a presentation about the activities of the GOFC-GOLD REDD working group since its establishment in 2005. Currently its main task is the review of the GOFC-GOLD REDD sourcebook and the development of the second version for presentation at SBSTA-29, early next year. The discussion about the new topics to be included and the next working steps of the group were the main objectives of the meeting.

In the near future, the working group will contribute and participate in the following events:

- 20/21 October 2008: Invitation to attend informal REDD methods meeting at UNFCCC Secretariat: Focus is on monitoring forest degradation.
- November 2008/February 2009: Capacity development organized by Coalition for Rainforest Nations, GOFC-GOLD is co-organizer, focus is on area change.
- 3-7 November 2008: GEO forest monitoring symposium: GOFC-GOLD is co-organizer of the thematic focus group.
- 26-28 November 2008: Expert consultation on national forest monitoring and assessment at UN FAO.
- 3 December 2008: Sourcebook presentation at side event at COP-14, jointly organized and hosted by Papua New Guinea and GOFC-GOLD.

In the second presentation, Mrs. **Needa Hoota (UNFCCC)** provided an overview of recent meetings and decisions of the UNFCCC related to the REDD issue. She reviewed the development of this topic from its introduction to the UNFCCC at COP-11 2005 in Montreal until now. Important meetings in 2008 have been the 28th SBSTA (4–13 June in Bonn, Germany), the REDD methodological workshop in Tokyo (25-27 June, Tokyo, Japan) and the Accra Climate Change Talks (21-27 August, Accra, Ghana). SBSTA-28 initiated the consideration of outstanding methodological issues, taking into account submissions by Parties to the Convention. In the main conclusions of the Tokyo meeting, the need for robust and cost-effective methodologies to estimate and monitor changes in forest cover and associated carbon stocks and greenhouse gas emissions was underlined (all presentations of the Tokyo meeting are available under http://unfccc.int/methods_and_science/lulucf/items/4289.php). A combination of remote sensing and ground-based assessments was considered a suitable approach. At the Accra meeting, the first discussion on policy approaches and positive incentives took place and a related in-session workshop was held (report available as FCCC/AWGLCA/2008/CRP.5 at http://unfccc.int/).

Alex Held (CSIRO) gave a presentation on Australian REDD activities and the GEO Task on forest mapping and carbon tracking. Australia's National Carbon Accounting System has been in place since 1990. The system includes remote sensing data, information about land use management, climate and soil. He reviewed the approach and the included models and reporting tools. The International Forest Carbon Initiative (IFCI) is Australia's contribution to global actions to address deforestation and forest degradation in developing countries, and to establish the necessary systems and financial mechanisms and ensure long-term emission reductions. The new GEO task in the 2009-11 Work plan, on "Forest Carbon Tracking", and its policy background and proposed activities was reviewed.

Tom Loveland (USGS) reported on the status of Landsat data access. In early 2009, the complete Landsat data archive held by USGS (Landsat 1-5 MSS, TM and ETM+) will be available electronically free to anyone. The archives are accessible via GloVis

(http://glovis.usgs.gov) and Earth Explorer (http://earthexplorer.usgs.gov). This is an outstanding step for earth observation, as it removes the key barriers to operational terrestrial monitoring needed for near-real time ecological forecasting and assessment. The Global Land Survey (GLS) data sets comprise global cloud-free, orthorectified Landsat data sets centered on 1975, 1990, 2000, 2005, and 2010, developed in a partnership of USGS, NASA and the US Climate Change Science Program. The release of GLS2005 is scheduled for December 2008.

Frank-Martin Seifert (ESA) presented the activities of the European Space Agency (ESA) toward REDD, and reviewed the cooperation with UNFCCC since 2001. Important contributions are the Kyoto Inventory project and the GSE Forest Monitoring, which have provide services related to the Kyoto Protocol since 2002. The GSE FM participated in the development of the UNFCCC post-Kyoto Protocol reduction of deforestation and degradation (REDD) mechanism in 2006. ESA is actively involved in ongoing REDD case studies and supports pilot cases in Cameroon and Bolivia within the frame of the GSE Forest Monitoring. Since 2004, ESA has supported the GOFC-GOLD Land Cover office at University Jena.

Yasumasa Hirata (FFPRI) presented Japanese projects and research activities relevant to REDD. The institute focuses its research on the synergy use of SAR and optical radar. Examples of current projects include the mapping of illegal logging in the Brazilian Amazon with ALOS, and the support of forest resources management in Indonesia. Ongoing research targets the development of a forest degradation index and carbon emission estimation methods based on PALSAR data.

Claudia Hiepe (FAO) gave a talk on the UN REDD Collaborative Programme – a cooperation of FAO, UNDP and UNEP. The goals of the programme are to assist developing countries, facilitate international cooperation, and provide support to the UNFCCC with regard to methodologies, risk management and payment structures. The UN REDD Roadmap is a living document to track monitoring and verification activities of UN-REDD programmes and partners in preparation to UNFCCC COP-15. Detailed information is accessible at http://redd.wetpaint.com/ . Possible activities in relation to GOFC-GOLD were suggested as:

- Develop a free remote sensing toolbox for REDD
- Create a comprehensive website linking to databases
- Build capacity on remote sensing for REDD
- Improve IPCC guidance (i.e. through Sourcebook)
- Explore applicability of existing methodologies to estimate carbon stock changes from degradation

Session 2: New Sourcebook chapters and critical issues

During the introduction, **Frédéric Achard (LC-IT)** reviewed the GOFC-GOLD sourcebook progress and evolution. In the development of the first draft of the sourcebook, 14 authors of 11 organizations were involved, including experts in the field of earth observation, carbon measurements and accounting. It was presented in Bali at COP-13, in 2007. The idea of the sourcebook is to provide a user-friendly synthesis of available technical procedures, recognizing the current status of UNFCCC negotiations. The sourcebook will complement the IPCC GPG-LULUCF (2003) and IPCC Guidelines-AFOLU (2006) by providing an additional explanation, clarification and enhanced methodologies for obtaining and analyzing key data. Thereby, it will support REDD early actions and readiness mechanisms on national level.

The sourcebook update will account for recent developments in the UNFCCC process. As an outcome of SBSTA-28, many capacity-building activities will take place at regional and

national levels in upcoming years. Therefore, sourcebook updates will put particular attention on tools to implement monitoring at national and sub-national levels.

Following these needs, the outline and overall structure of the REDD sourcebook was adopted by the working group. The proposed table of contents for the second version is included in Appendix C and includes new chapters on:

- Monitoring of forest regrowth
- Methods for estimating GHG emissions from biomass burning
- Status of evolving technologies
- Practical examples for data collection
- overview of annex-1 GHG's national inventories on LULUCF
- national carbon assessment through carbon budget model
- forest inventories at community level
- forest carbon assessment at project level

In the following presentations, these new topics were addressed. **Frédéric Achard (LC-IT)** gave a presentation on methods for monitoring forest regrowth. In the first version, the sourcebook takes into account only deforested and degraded forest areas to estimate GHG emissions. The presentation showed examples of forest regrowth in different regions, e.g. French Guyana, Congo Basin, Cambodia and Laos as seen from different types of remote sensing data. An ongoing research study was presented using MODIS time series to identify regrowth after fire events in the Amazon region (Morton, DeFries et al., in prep.).

Chris Justice (Fire-IT) spoke on greenhouse gas emissions from biomass burning. One main goals of the GOFC-GOLD Fire Implementation Team is to generate operational fire emission products of known accuracy and provide annual and near real-time emission estimates. The issue has been a long-term agenda item for GOFC-GOLD and was discussed at the Fire-IT workshop in Thessalonica, in 2007. The importance of biomass burning is immense. Several examples of satellite based global estimates of biomass burning emissions were presented. The presentation further discussed current methodological issues for detecting burned area and active fires. Priorities were defined to improve regional to global emission estimates. Further information on the Fire-IT activities are available at: http://gofc-fire.umd.edu/index.asp.

Giacomo Grassi (JRC) addressed the topic of estimation of uncertainties. This is an important issue as the uncertainty in current estimates of emissions from deforestation is high. There is a need to consolidate and increase consistency among existing sections on uncertainties in different chapters of the sourcebook, and to update the content with the issues emerging from ongoing negotiations. The new chapter will therefore include appropriate methodologies to quantify the uncertainties and its possible application in the accounting context. To avoid an over-estimation of emission reductions, the sourcebook suggests the "principle of conservativeness" (Grassi et al. 2008). This principle may simplify the reporting requirements by providing an incentive for increasing the quality of the estimates and increase the credibility of any REDD mechanism. The presentation explained the importance of this principle and specifies the main elements that will be addressed in the individual subsections of the new chapter.

Martin Herold (LC-IT) presented evolving data sources and technologies to be included in the sourcebook. This comprises technologies and approaches for monitoring changes in forest area, forest degradation and carbon stocks which are not yet operational for national level assessments and require further research but will be potentially useful for REDD implementation. Their utility may be enhanced in coming years depending on data acquisition, access and scientific developments. The presentation reviewed existing

capabilities and targeted remote sensing surveys to support carbon accounting. It showed examples of LIDAR (Light Detection and Ranging) and SAR observations. LIDAR provides three-dimensional information of forest stands and allows for the estimation of tree height, volume, and crown closure. Currently, most observations are airborne and only one space-borne system is available (ICESAT/GLAS). Especially for tropical regions, the weather independent SAR technology maybe a useful technique, and is currently being tested in several case studies. In conclusion, the importance of synergy among different data sources was highlighted.

Danilo Mollicone (University of Alcala) showed the application of carbon budget models using the example of Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS), on behalf of **Werner Kurz, NRC-CFS**. The budget model CBM-CFS3 is a national-scale model of forest ecosystem Carbon dynamics and is freely available at http://carbon.cfs.nrcan.gc.ca/. The model integrates information from forest inventories, natural disturbance monitoring, forest management, land use change and ecological parameters. Remote sensing based programmes are used to determine annual area burned and area deforested over multi-year periods. It provides a spatially explicit change monitoring and carbon budget and is compliant with IPCC Good Practice Guidance. Several ongoing and planned scientific activities will improve the modeling framework.

Patrick van Laake (ITC) gave a presentation on how local communities can support forest inventories. The management of local forest resources by organized community groups has proven to be very successful. With some training and support, the local communities can accurately assess basic parameters of the forest. This is cost-effective and has a potential for collecting large volumes of data. For REDD the assessment of change in biomass is needed and requires very accurate estimates at different points in time. Remote sensing techniques are not yet accurate enough for this task. The data collected by local communities are collated at higher levels in the national hierarchy and can finally be used to compute national emission reductions. Validation at the international level may very well require remote sensing. The presentation showed examples from Senegal and PNG.

In the last presentation of the session **Philippe Mayaux (JRC/GOFC-GOLD vice chair)** emphasized the role of the Regional Networks (RN) in the context of REDD. Forest services, operational monitoring centres, universities and resource persons are involved in RN's. Their goal is to support the exchange of data, experience and models, and on the other hand to provide a link to global initiatives and national users. Almost all GOFC-GOLD RN's are acting in "REDD relevant" regions, e.g. OSFAC, WARN, Miombo, SAFNet in Africa, SEARRIN and India/South Asia in Asia, REDLATIF and AMAZON in South America. For capacity building, they could provide training of national users and support regional workshops. Regarding regional estimates of Carbon budget, they could support the implementation of combining of in-situ and space-based data or the validation of deforestation estimates. Furthermore, RN's can provide the link to other local forest policies.

5 Breakout group discussions

The discussions were organized into four breakout groups (BOG) to define major points for the new chapters and to define the people willing to contribute in the preparation of the chapter:

- Biomass burning (Justice)
- Evolving technologies (Held)
- Degradation and regrowth (Achard/DeFries)

- Data collection at local/national level (Van Laake/Mayaux)

Outcomes of BOG 1: Biomass burning

General comments:

- A chapter on biomass burning can provide good input on implementing IPCC reporting guidelines (national biomass burning emissions –grasslands, agriculture), but for this we agreed to stick to REDD Ch4 Forests
- EO includes satellite and in-situ (issue of consistency when combining these)
- For fire issue: FIRE YEAR reporting
- Group focused on the 6-step-process – how to measure
- Recognize real limitations of current methods

Step 0: Area of Forest by Type:

- Problems matching forest type with table 2.4 (?) Fire Forest Categories: mix of vegetation and fire types, forest type influences the measurement technique

Calculating emissions (Standard Approach):

Emissions =	**burned area ***	**fuel load ***	**combustion completeness ***	**emission factor**
	- satellite sources - airborne - in-situ	- average fuel loads in situ - dynamic vegetation production models - satellite derived estimates of Net Primary Production, empirical relations for fuel types allocation	- Average values - Field based parameterizations based on fuel types and fuel moisture - Link to Fire Danger systems	- Average values - Field based parameterizations based on fuel types and fuel moisture
comments				

Step 1: Area Burned:

- Suitability of methods varies by category
- Suggested that grouping categories will be the best way to write the section and allocate methods
- In some areas, satellite observations will be applicable, in others not
- Issue of consistency when using multiple sources
- Need to specify what will work where, and where available with what accuracy

In conclusion, all attendees of the BOG offered to contribute in the preparation of the chapter. Especially, the IT members involved in emissions should be engaged plus some other experts. There was agreement that it will take some work. In terms of outline, at least four pages are envisaged. Finally, the BOG strongly suggested that GOFC-GOLD take the initiative to design a better system for Post Kyoto reporting or whenever the Next Version comes out. As an example of a missing topic "peat" was mentioned, in anticipation of the increasing importance of organic soils in the future.

Outcomes of BOG 2: Evolving data sources and technology

Introduction:

- Note: A generic statement on importance of data continuity, systematic acquisition and redundancy for any new technology (e.g. GEO Virtual constellations –LSI Constellation) should be added
- Moving from Research to Operational / tier 1 to tier 3

- Role and use of evolving technologies (e.g. operational forest change/degradation mapping & verification activities)
    - Provide a level of objectivity in measurements
- Include link to CEOS EO Handbook for update on new missions (online)
- Why would we want to do these measurements? Costs? Special conditions where would you use the technology
- Other issues of importance
    - System specifications, resolution, bands, observation strategy
    - Data policy by operators of technology
    - Costs of establishing the capability in the first place, validation included in costs?
    - Accuracy assessments (to give confidence)

Sections on SAR, LIDAR, etc.:

- SAR –Draft Section from Joseph Kellndorfer, Dirk Hoeckman, Ake Rosenqvist:
    - Topics: technology basics, advantages, product maturity, types of products, operational capability for large area forest extent, deforestation and change mapping, forest degradation (selective logging), data access/cost and continuity (via CEOS agencies) recommendations, key requirements, systematic acquisition strategy requirements, multi-temporal data acquisition (part of national the REDD contribution) and pre-processing, timing for acquisition (dry vs. wet season), terrain correction requirements, scientific references and links to projects/programs, examples, options, developments, future satellite missions
    - Note: DEM Generation also of value
- LIDAR –Draft Section from Mike Wulder: concentrate on airborne technologies at this point, carbon stocks, useful for sampling and site-based verification (ICESat/Glass examples?)
- Fine resolution: purpose, e.g. for use in validation and accuracy assessment (Caccetta and others?)
- Hyperspectral: include short section on technology and potential future applications (Asner, Held?)
- Thermal Imagery: forest fire radiative power estimation (draft by Justice & Chuvieco)
- Data integration tasks: draft from Mike Wulder

Recommendation section:

- Table on outputs (measurements) vs. technology options: e.g. Height, stratification, biomass, 'density', forest types

Outcomes of BOG 3: Degradation & regrowth

New structure of sourcebook considered:
2.1 Guidance on Monitoring of Changes in forest areas

Introduction on data type and availability (historical and future)

Reference level / baselines: criteria should be the same – e.g. 30-m resolution satellite data are available globally in 1990, 2000 and 2005 (NASA / USGS GLS dataset).

More data available for a limited number of countries (Brazil annually, India bi-annually)

2.1.1 Monitoring of changes of forest areas (deforestation and reforestation)

This section includes monitoring of gross deforestation (Forest areas to non forest areas) and forest expansion (aforestation or reforestation: non forest areas to forest regrowths or plantations).

Operational examples of monitoring gross deforestation in tropical humid domain: Brazil

Operational examples of monitoring changes between forest and non forest areas in tropical humid and dry domains: India, Cameroon (tbc)

Operational examples of monitoring other land becoming forest land: Costa Rica, South Africa (plantations)

2.1.2 Monitoring of forest area changes within forests (forest remaining forests)

General remarks:

- There is no need for a definition of 'forest degradation' (in the context of biomass). Different processes of degradation exist.
- What is needed is to monitor changes in forest types leading to C stock changes (decrease of C stocks through degradation processes and enhancement of C stock changes through forest management practices or natural regrowths).
- Forests can be disaggregating in a few sub-categories. Remote sensing can contribute to identifing affected areas and consequently to monitor changes between these areas.
- There are time and spatial scale issues related to the monitoring of changes within forest areas (in particular for logging and shifting cultivation).
- In general, processes that lead to changes within forests remaining forests require data at finer spatial and temporal resolution than deforestation, and detection has lower accuracy.

Identification of processes of changes within forest areas which are detectable (i.e. mapping of areas is possible) from satellite remote sensing:

1. Logging:
   - Sustainable forest management or low impact logging may not be detectable by satellite remote sensing (contrary to intensive logging). Detection with very high resolution data (e.g. QuickBird, IKONOS) is not practical over large areas due to the expense of data collection and analysis.
2. Shifting cultivation or abandonment of farmland (leading to forest regrowths or secondary forests):
   - Shifting cultivation areas or regions might be considered as non forest land as the predominant use is agriculture.
   - There is a specific issue of recognition / claim of old shifting cultivation areas (pre 60s) in South Africa.
   - Agro-forestry (Tree/Crops mosaics):
   - It might be considered as land under forestry use.
3. Forest plantations (Conversion of 'Intact forests' to ...):
   - Operational examples: South Africa (frequent monitoring), Australia
   - No operational examples in humid tropics?
4. 'Intact forests' versus non intact forests:
   - Related to a biodiversity concept.

5. Fires:
   - Degradation of forests (including peat forest) in Kalimantan through exceptional fire events in 1997 and 1998.
   - Large burn scars from escaped fires are often visible on satellite imagery but the accuracy of detecting them in tropical forests is low.

Outcomes of BOG 4: Data collection at local/regional level

General articulation between levels
Hierarchy between the different inventories: national inventories correspond to specific needs (linked to policies like UNFCCC), while community-based ones have different objectives.
Take advantages of community-based inventories and put these huge but incomplete datasets in a national framework.

Involvement of local communities in forest inventories
Usually forest inventories are government-driven, but involve of local communities (Ghana, Senegal, South Africa, Cameroon, Malaysia).

In Ghana the State owns the land, but local chiefs have a strong influence. Land can be leased to somebody, while the trees on the land are still the "property" of the chief.

Land tenure and land ownership issue: potential conflicts between different levels

Differences between strong states and weak states
Whatever Top-Down or Bottom-Up approach is used, the communities need to be involved.
Which mechanism?
1. inventories done by communities which are paid by government
2. inventories done by government who give indemnities to the communities for loss of opportunities

Committees at different levels (similar to FLEGT process) are involved at different stages of the process: local communities, NGOs, regional forest services, international community…

Raising awareness
Advantage = data collection by communities increase the ownership, which may contribute to the reduction of deforestation.

Future editions of the Sourcebook
General implementation (including governance issues)
Capacity-building
Section on drivers of deforestation?
Chapter 3.5 Forest inventories at community level
Data collection focus on local to national level

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Appendix B – Agenda

GOFC-GOLD Workshop on Reducing Emissions from Deforestation and Forest Degradation (REDD)		
Monday, 13.10.2008, Rose Halls, Room 101		
SESSION 1: Introduction and requirements		
09.00-09.15	Opening and objectives	Herold
09.15-09.20	Welcome note	Benndorf
09.20-09.35	Status of UNFCCC discussions/decisions	Hooda
09.35-09.50	Australian activities and new GEO task	Held
09.50-10.00	Status of Landsat data access	Loveland
10.00-10.10	ESA activities on REDD	Seifert
10.10-10.20	Japanese REDD activities	Hirata
10.20-10.30	UN REDD roadmap	Hiepe
10.30-11.00 Break (incl. poster session of REDD case studies)		
SESSION 2: New sourcebook chapters and critical issues (10 min presentation)		
11.00-11.10	Sourcebook progress and evolution	Achard
11.10-11.20	Monitoring forest regrowth	Achard
11.20-11.30	GHG from biomass burning	Justice
11.30-11.40	Section on uncertainties	Grassi
11.40-11.50	Evolving technologies	Herold
11.50-12.00	Carbon budget model examples	Mollicone
12.00-12.10	Community-based inventories	Van Laake
12.10-12.30	Role of regional networks	Mayaux
12.30-13.30 Lunch (incl. poster session of REDD case studies)		
SESSION 3: Evolving issues and breakout groups		
13.30-14.00	Discussion and definition of breakout groups	DeFries/Achard/Herold
14.00-15.00	Breakout group discussions	All
15.00-15.30 Break (incl. poster session of REDD case studies)		
SESSION 4: Breakout group discussions		
15.30-16.30	Breakout group discussions Potential groups: Monitoring forest degradation Evolving technologies Data collection for REDD	All
16.30-17.00 Break (incl. poster session of REDD case studies)		
SESSION 5: Breakout group reports and discussions		
17.00-17.30	Report from breakout groups	All
17.30-18.00	Open discussions	
18.00-18.30	Define actions and plan for COP14	

Appendix C – Poster Session

GAF AG: REDD Pilot Project Cameroon, Quantifying Deforestation and Degradation

Hirata, Y.: Research on the feasibility to estimate the GHG emissions reduction through avoiding deforestation.

Wielaard, N.: PALSAR and ASAR radar for systematic monitoring of tropical (peat swamp) forest.

Erasmi, S.: Stability of rainforest margins in Central Sulawesi, Indonesia.

Spessa, A.: Fire in the Vegetation and Peatlands of Equatorial SE Asia: Patterns, Drivers and Emissions

Spessa, A: Seasonal Fire Activity Predictions Using a Coupled Fire and Vegetation Model.

Sambale, J. et al.: Developing national forest monitoring capacities for REDD participation: Vanuatu.

Appendix D – Proposed table of content for second version of REDD sourcebook

Appendix E – Relevant documents

UNFCCC:

Informal Meeting of Experts on Methodological Issues relating to Reducing Emissions from Forest Degradation in Developing Countries, 20 – 21 October 2008 in Bonn, Germany: http://unfccc.int/methods_science/redd/items/4579.php

3rd UNFCCC Workshop on Methodological Issues relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, 25 – 27 June 2008 in Tokyo, Japan: http://unfccc.int/methods_and_science/lulucf/items/4289.php
Report: http://unfccc.int/resource/docs/2008/sbsta/eng/11.pdf

COP-13:
Decision 2, Reducing emissions from deforestation in developing countries: approaches to stimulate action:
http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=8

SBSTA-28:
Views on outstanding methodological issues related to policy approaches and positive incentives to reduce emissions from deforestation and forest degradation in developing countries - Submissions from Parties:
http://unfccc.int/resource/docs/2008/sbsta/eng/misc04.pdf

Good Practice Guidance for Land Use, Land-Use Change and Forestry
In particular Chapters 2 and 4:
Chapter 2: Basis for Consistent Representation of Land Areas
Chapter 4: Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol

GOFC-GOLD:

GOFC-GOLD REDD Sourcebook: http://www.gofc-gold.uni-jena.de/redd/

General:

Tropical deforestation and greenhouse gas emissions: Special Issue in Environmental research Letters: http://www.iop.org/EJ/abstract/1748-9326/2/4/045021