Evolving UNFCCC requirements for biomass mapping from space: GCOS/TOPC, IPCC, GFOI …

Martin Herold

with contributions by many …

GLOBBIOMASS user meeting
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Issues

1. ECV Biomass - needs from 2016 GCOS implementation plan

2. IPCC 2019 refinement of Good Practice Guidelines

3. Paris agreement: enhancing transparency

4. Global Forest Observations Initiative (GFOI)

2016 GCOS implementation plan

Above-ground biomass	Above-ground living biomass (excludes roots, litter and dead wood) Forest above-ground biomass (AGB) is sometimes derived using the subsidiary variable forest height.	The growing stock volume (related to biomass by wood density) of boreal and temperate forests has been estimated from long time series of C-band SAR data (ESA Envisat) with relative accuracy of 20-30% at 0.5° resolution. L-band SAR data can be used to estimate forest biomass up to about 100 t ha-1, but the JAXA PALSAR-2 is the only L-band SAR currently in orbit. Tropical biomass maps have been derived from forest height measurements made with the IceSAT lidar which failed in 2009. Three missions dedicated to measuring forest structure and biomass are planned to be in orbit by 2021; the ESA BIOMASS P-band SAR; the NASA Global Environmental Dynamics Investigation vegetation lidar on the International Space Station; and the NASA-ISRO NISAR L-band radar. The Argentine SAOCOM 1-A L-band SAR is also due to launch in 2017. Airborne lidar can provide biomass maps at district to national scale. No designated baseline network exists. The FAO's Forest Resource Assessments provide national statistics but not spatially explicit map-type data on forest biomass.	GOFC-GOLD (2015a) GOFC-GOLD (2015b) GFOI (2013) IPCC (2006)	No global data centre for either forest or non-forest biomass.

Anthropogenic greenhouse gas fluxes	Emissions from fossil-fuel use, industry, agriculture and waste sectors	Estimated from fuel and activity statistics CDIAC, BP, IEA for global estimates, national reporting to UNFCCC	IPCC (2006) IPCC (2013) GFOI (2014)	National reporting to UNFCCC CDIAC Global Carbon Project
	Emissions/removals by land-use sectors	Estimated by IPCC methods using statistics and satellite observations of changes in land cover (see ECV land cover and above ground biomass) National reporting to UNFCCC		
	Emissions/removals by "land sink"	Improved knowledge on afforestation, reforestation and forest growth rates Direct measurements of fluxes such as FluxNet		Global Carbon Project
	Estimated fluxes by inversions of observed atmospheric composition	Observations of atmospheric composition, in situ and satellite; modelling of atmospheric transport and processes in a data-assimilation scheme GAW, IG3IS, GEOCarbon, ICOS, CEOS Carbon Observations Strategy, Copernicus C3S/CAS, Global Carbon Project		Global Carbon Project

2016 GCOS implementation plan

■ **GCOS Actions related to ECV BIOMASS:**

1. Action T52: Encourage inter-agency collaboration on developing optimal methods to combine biomass estimates from current and upcoming missions

2. Action T53: Encourage inter-agency collaboration to develop validation strategies

3. Action T54: Develop a set of validation sites covering the major forest types, especially in the tropics

4. Action T55: Promote access to well-calibrated and validated regional- and national-scale biomass maps

5. Action T56: Improve access to high-quality forest inventories, especially in the tropics, including those developed for research purposes and REDD+

2019 Refinement of the IPCC GPG

- First update since AFOLU guidance of 2006: update and evolution in selected areas

- Two important issues:

    - New section: Develop guidance on how to use biomass density (amount per unit area) maps generated from remote sensing data

    - Update default values for BEF/BCEF and root/shoot ratio, average biomass stocks, and average biomass increments
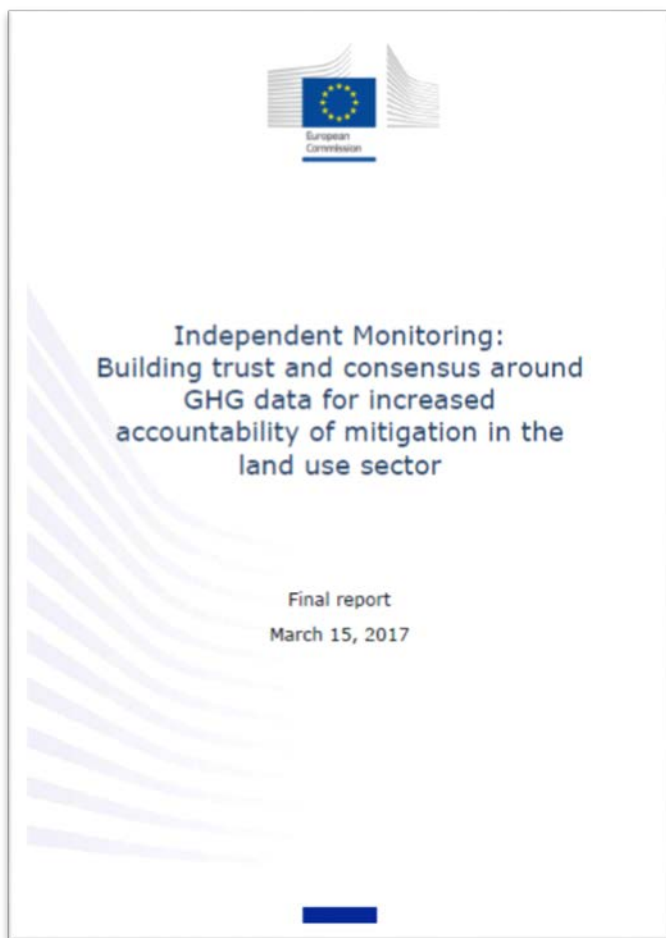
2019 Refinement of the IPCC GPG

- What is the potential use of biomass maps in frame of GHG inventories:

  - Assess C-stocks and EF to produce emissions estimates, incl. to increase data density in under-sampled or inaccessible areas

  - Integration with AD to produce wall-to-wall maps/estimations

  - Verification purpose (i.e. for Tier 3 approaches)

- How have maps been constructed, how well the maps have been calibrated and validated with ground data?

- Need to consider uncertainties and perhaps update in GPG uncertainty chapter (currently does not include such issues)

2019 Refinement of the IPCC GPG

- Updating (Tier 1) biomass defaults: try to replace (broad) value ranges by mean/SD, perhaps refine stratification (i.e. intact vs. degraded forests)

- Derive updated default values considering and integrating data sources from:

  - Current Tier 1 values

  - FAO FRA reporting

  - The IPCC Emission Factor Database

  - New country data (i.e. from UN-REDD etc.)

  - Tropical forest biomass plot networks

  - Biomass maps, incl. Globbiomass product?

Paris Agreement: Art. 6 enhancing transparency

Independent Monitoring:
Building trust and consensus around
GHG data for increased
accountability of mitigation in the
land use sector

Final report
March 15, 2017

- Framework currently negotiated under UNFCCC

- Independent and transparent monitoring broadens stakeholder participation and confidence;

- Complements mandatory reporting by national governments

- Relies on open access to a diversity of inter-operable approaches, datasets and initiatives
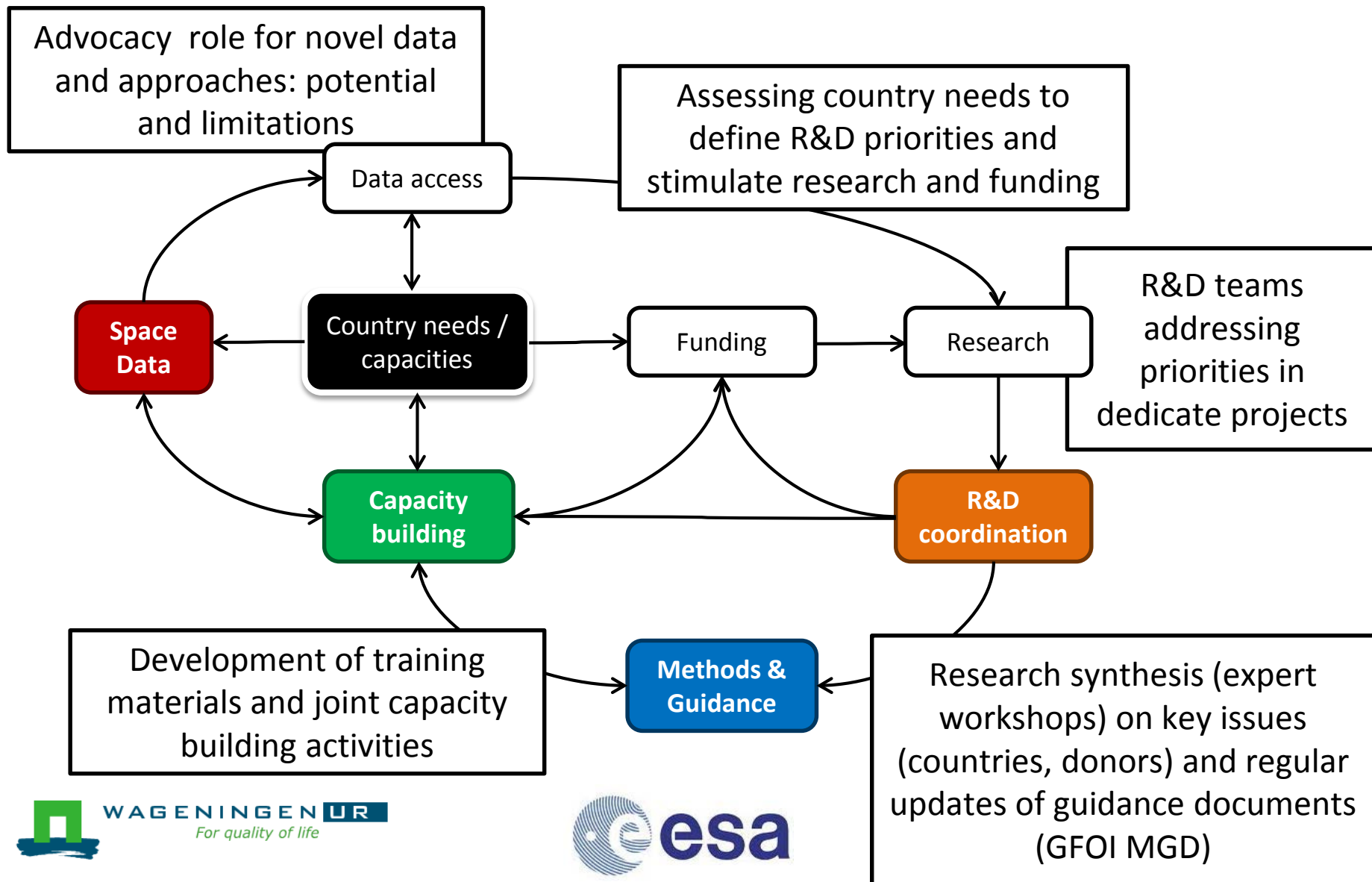
Paris Agreement: Art. 6 enhancing transparency

Recommendations for biomass mapping from space:

- Research and pre-operational demonstrations to improve the quality, consistency and complementarity of satellite-derived biomass map products

- Provide demonstrations and community-consensus guidance to better harmonize space-based and NFI-based biomass estimation

- Support efforts to reconcile the large differences between the AFOLU databases, scientific studies (as reflected in IPCC reports) and country reported data

- Ensure seamless continuity and consistency of biomass mapping from space after the ESA BIOMASS mission ends

R&D coordination as part of the GFOI

Advocacy role for novel data and approaches: potential and limitations

Assessing country needs to define R&D priorities and stimulate research and funding

R&D teams addressing priorities in dedicate projects

Data access

Space Data

Country needs / capacities

Funding

Research

Capacity building

R&D coordination

Development of training materials and joint capacity building activities

Methods & Guidance

Research synthesis (expert workshops) on key issues (countries, donors) and regular updates of guidance documents (GFOI MGD)

Training materials for REDD+ monitoring

- 14 modules: lectures, country examples, exercises
- 3 languages (English, French, Spanish)
- 30+ authors, regular updates incl. scientific synthesis
- Regional workshops (Asia, Africa, Latin America)
- Recorded lectures and E-learning tools and webinars

http://www.gofcgold.wur.nl/redd/training-materials/
https://www.forestcarbonpartnership.org/redd-training-material-forest-monitoring

R&D synthesis workshops

- **Key: MGD, REDD+ compass (www.gfoi.org)**

- **5 R&D workshops in 2014/15/16 (www.gfoi.org/rd)**

- **Oct/Nov 2016**: Joint GFOI/GOFC-GOLD R&D workshop

  - R&D working plan for next years, incl. biomass

  - http://www.gofcgold.wur.nl/sites/gofcgold-gfoi_sciencemeeting2016.php

- **Upcoming workshops**:

  - Emission factor uncertainty (relation to total C-emissions) and uncertainty of the trend in emissions (tbc, Jan. 2018)

  - Near-real time monitoring (tbc, Febr. 2018?)

Remarks

1. ECV Biomass (GCOS/TOPC)– emphasis on coordinated approaches for multi-sensor estimation and validation; land use sector emissions

2. IPCC 2019 GPG refinement: manifesting role for biomass maps in national GHG inventories

3. Paris agreement: enhancing transparency framework will pose new requirements (stakeholders)

4. GFOI: from research to expert synthesis for supporting countries, assessing uncertainty in EF