Biomass data for climate change mitigation: revised IPCC guidance and upcoming opportunities

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General Objective of 2019 Refinement for the AFOLU sector

- Overall, the 2019 Refinement of the 2006 IPCC Guidelines builds on the objective of providing updates and new guidance to the 2006 IPCC Guidelines for chapters 1-12.
- The main changes the 2019 refinement for the AFOLU sector are related to the following:

✓ *Provision of New Guidance*

✓ *Provision of updated default emission factors*

✓ *Provision of new default emission factors*

✓ *Better and more complete coverage of sections*

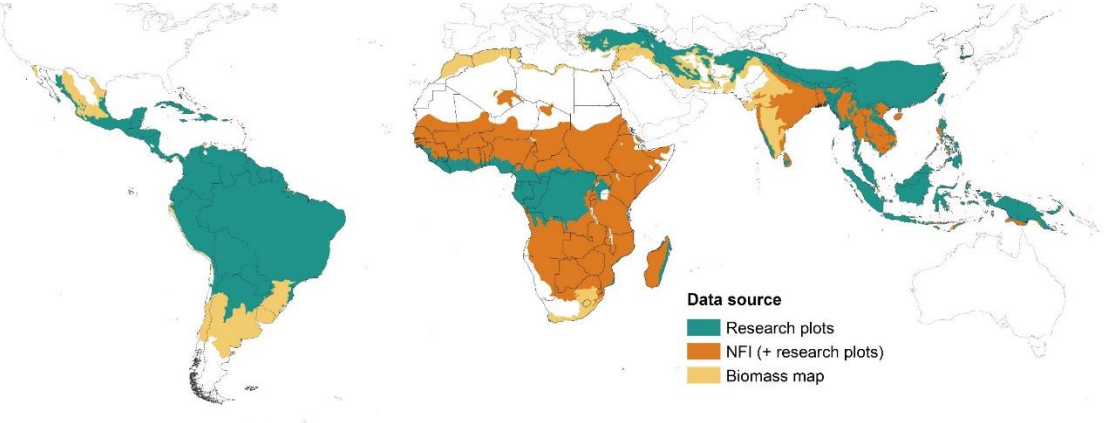
2019 Refinement of the IPCC Good practice guidelines (GPG) - biomass

- Approved by IPCC plenary in May 2019
- https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html
- Important sections with refinement:
  - Improved guidance on land representation (many references to GFOI / GOFC-GOLD)
  - Tier 1 updates: in particular for forest (biomass, regrowth etc.)
  - Guidance on use of allometry, biomass density maps

2019 Refinement of the IPCC GPG: updating biomass defaults

- Improve mean and SD based on new plot (network) data
- Increase traceability (also for any future updates)
- Refine stratification beyond use of ecozones and continents (to reduce large ranges):
    - Primary (old-growth forests that are intact or with no active human intervention)
    - Secondary forests (all other forests) - young secondary forests (< 20 years old) will be included as a separate category (if data allows)
- Explore the use of remote sensing-based products to fill remaining gaps (limited success)

2019 Refinement of the IPCC GPG: updating biomass defaults



- Partnership: research, countries, FAO/UN-REDD, Worldbank FCPF
- Research network plots in humid tropics
- NFI's make a big difference for Africa
- Split in young/old secondary forests only for some tropical strata
- Biomass maps for lower biomass area (Globbiomass)

	South America	Africa	Asia
Tropical wet			
Primary	604	349	214
Secondary >20 years	328	62	94
Secondary ≤20 years	513	29	88
Tropical moist			
Primary	147	25	11
Secondary >20 years	185	7052	60
Secondary ≤20 years	353		
Tropical dry			
Primary	33	9216	36
Secondary >20 years	72		
Secondary ≤20 years	44		
Tropical shrubland			
Primary		19	
Secondary >20 years		2607	
Secondary ≤20 years			
Tropical mountain system			
Primary	106	64	30
Secondary >20 years	21	1852	14
Secondary ≤20 years	114		36
Subtropical humid			
Primary			29
Secondary >20 years			26
Secondary ≤20 years			5
Subtropical dry			
Primary			
Secondary >20 years			
Secondary ≤20 years			
Subtropical steppe			
Primary			
Secondary >20 years			
Secondary ≤20 years			

Value = number of plots

Research plots
NFI plots, or both
No data

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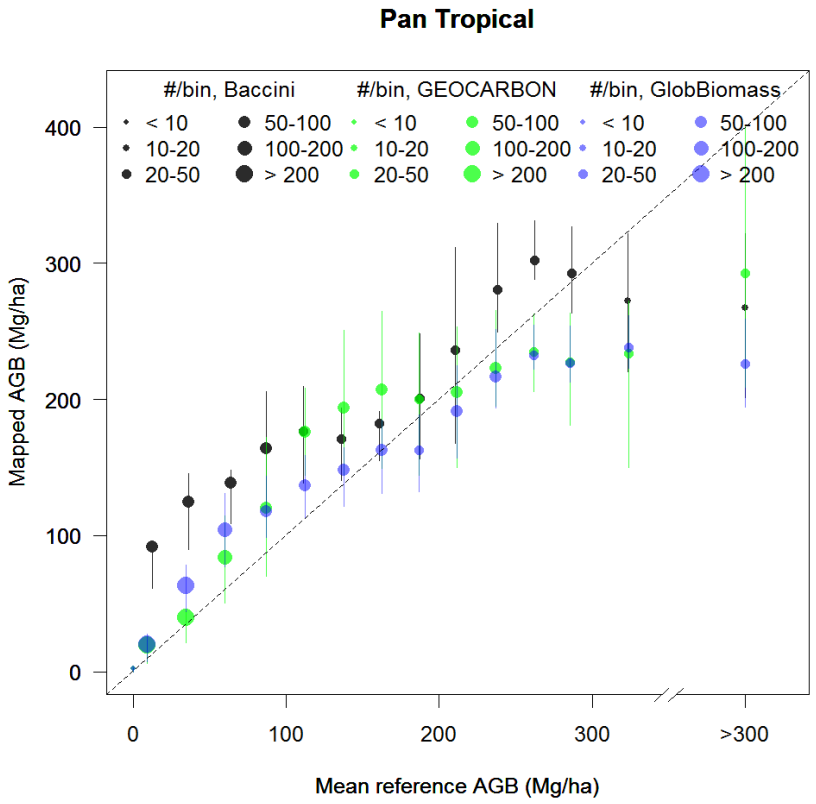
Uncertainty analysis and comparison for different global biomass maps



- Independent validation based on a total of 109,902 plots from 7 continents
- ESA GLOBBIOMASS 2010 map
- Low regional bias for lower biomass ranges
- Underestimation for higher biomass (implications for EF estimation)
- Next 2017 map forthcoming as part of ESA BiomassCCI project

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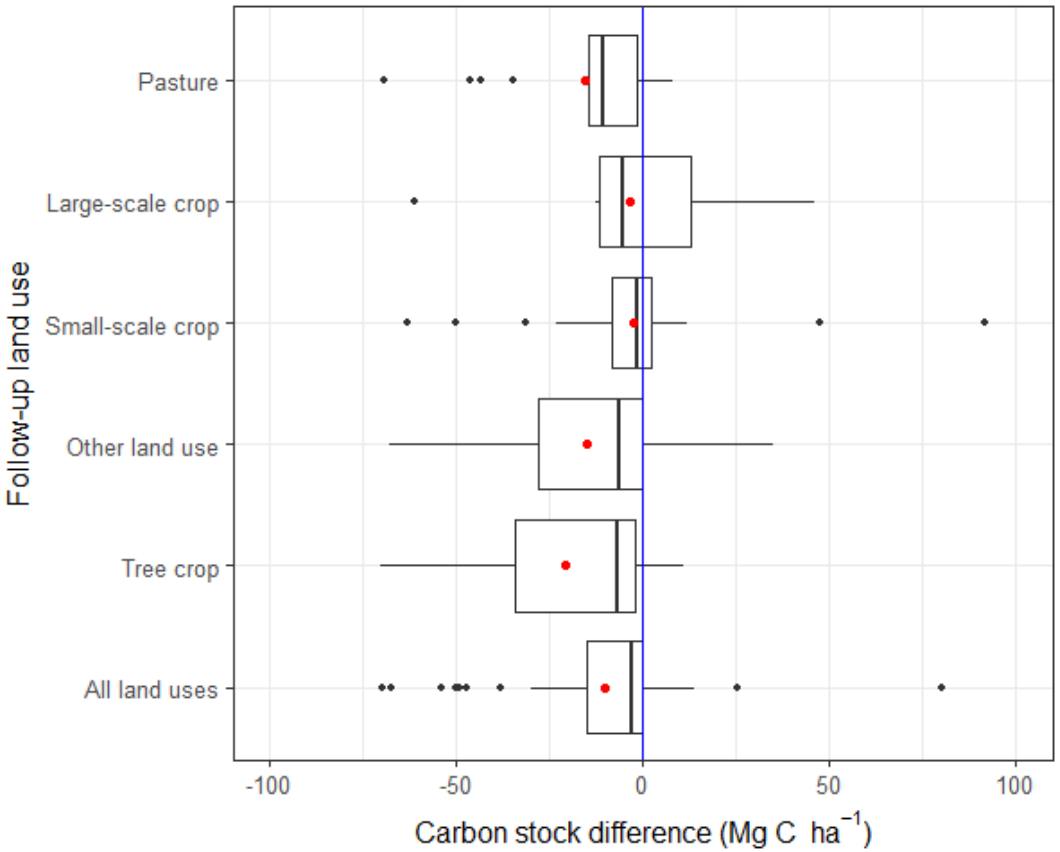
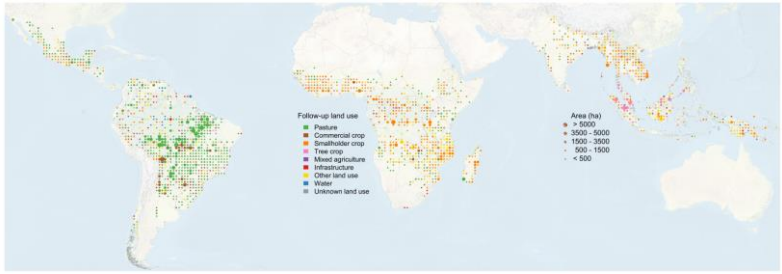
TABLE 4.7 (UPDATED)
ABOVE-GROUND BIOMASS IN NATURAL FORESTS [TONNES D.M. HA^{-1}]

Domain	Ecological zone [1]	Continent	Status/condition[2]	Aboveground biomass [tonnes d.m. ha-1]	Uncertainty	Uncertainty type	References
	Tropical rainforest	Africa	Primary	404.2	120.4	SD	1-12
			Secondary >20 years	212.9	143.1	SD	5-7, 11, 13-16
			Secondary ≤ 20 years	52.8	35.6	SD	9-11, 14, 15, 17
		North and South America	Primary	307.1	104.9	SD	3, 4, 9, 10, 18-21
			Secondary >20 years	206.4	80.4	SD	9, 10, 22-28
			Secondary ≤20 years	75.7	34.5	SD	9, 10, 14, 22, 23, 28-32
		Asia	Primary	413.1	128.5	SD	3, 4, 9, 10, 33-35
			Secondary >20 years	131.6	20.7	SD	9, 10, 36, 37
			Secondary ≤20 years	45.6	20.6	SD	9, 10, 37-39
	Tropical moist	Africa	Primary	236.6	104.7	SD	1, 2, 16
			Secondary >20 years	72.8	36.4	SD	9, 10, 16, 40-47
			Secondary ≤20 years				
		North and South	Primary	187.3	94.0	SD	3, 4, 9, 10, 18-21
			Secondary >20	131.0	54.2	SD	9, 10, 22-26

Estimation emission factors: C-stocks before and after





- Based on pantropical study (De Sy et al., 2015)
- Country level mean carbon stock difference (Mg C ha^{-1}) of converted forests compared to mean carbon stock of all forests in the country, per follow-up land use

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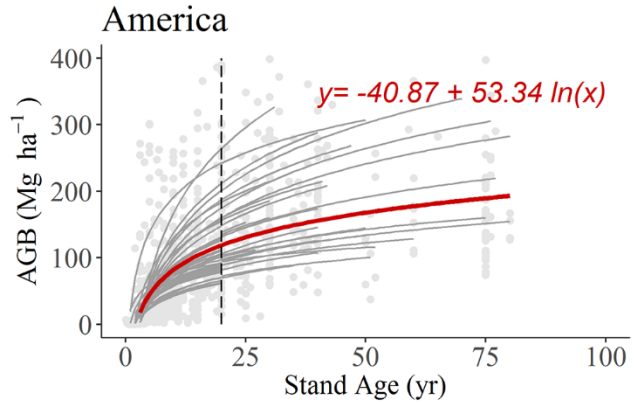
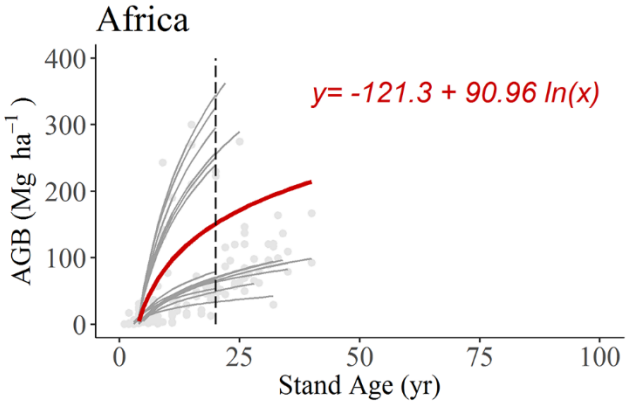
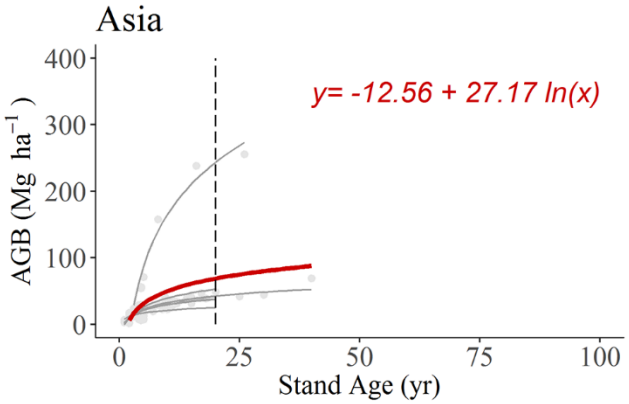
For secondary forests

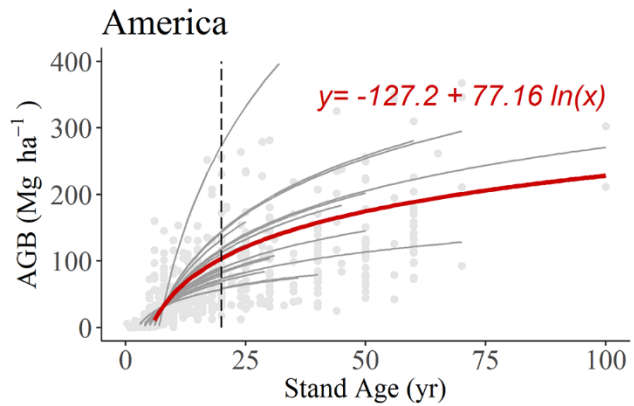
Tropical rainforest

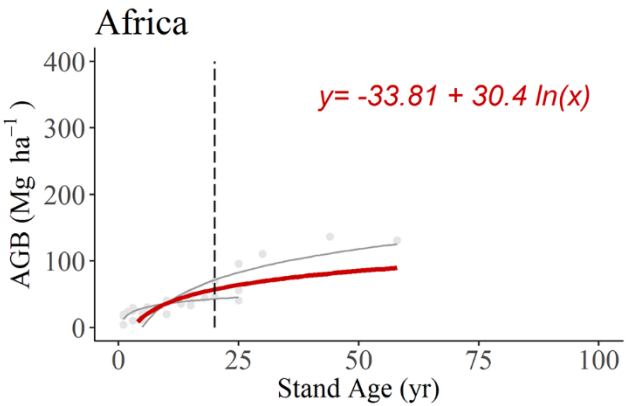


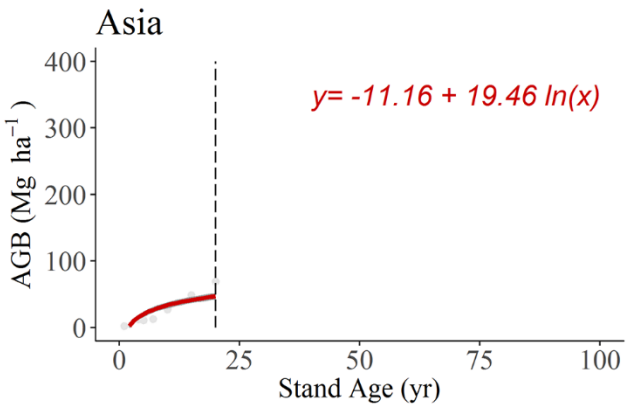




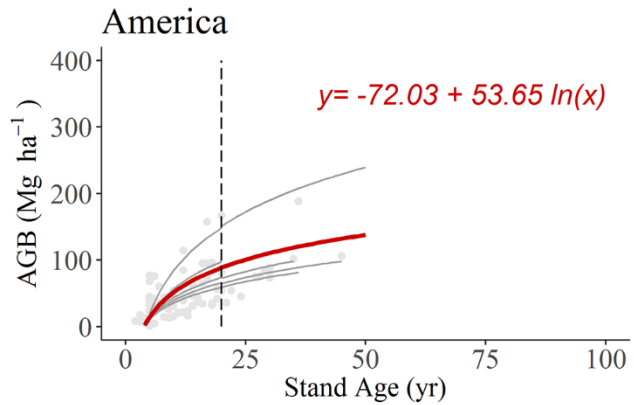
Tropical moist forest

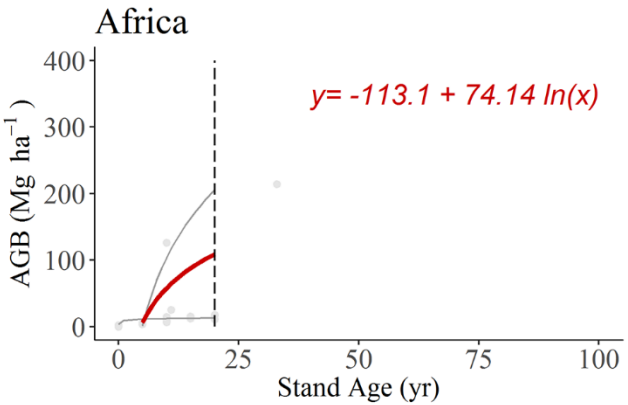


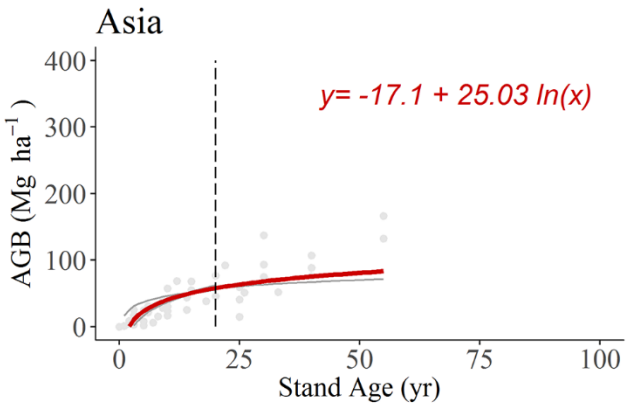




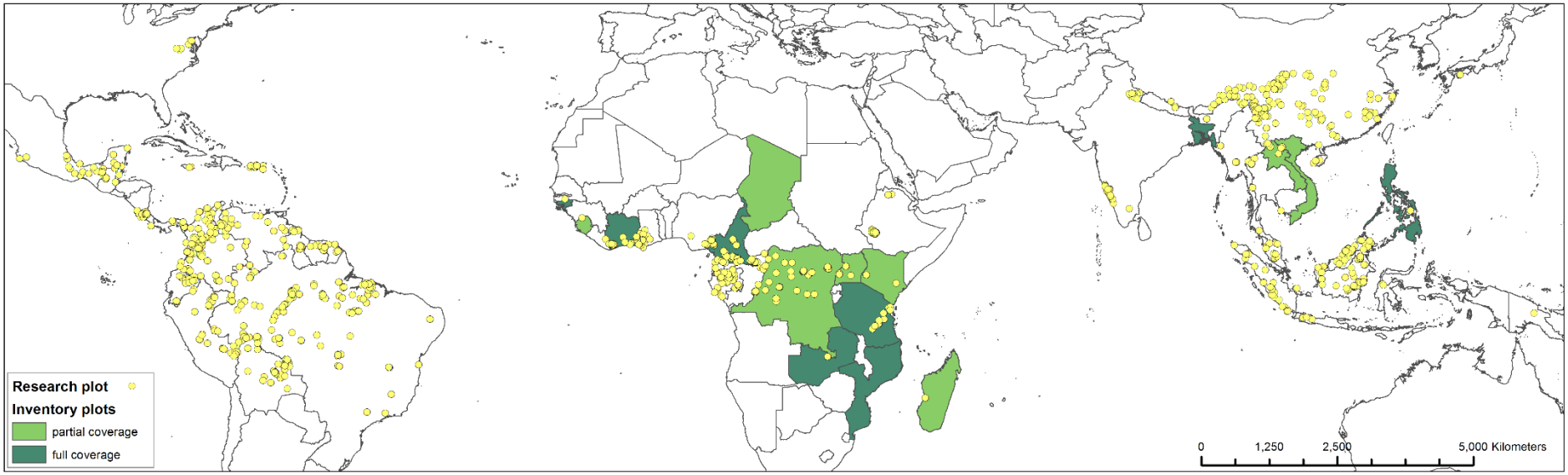
Tropical mountain system







2019 Refinement of the IPCC GPG: partnership for updating the Tier 1 defaults for biomass



- Partnership: research, countries, FAO/UN-REDD, Worldbank FCPF ...
- Joint initiatives/more practical examples for IPCC refinement follow up
- Value of national data to improve data on biomass and regrowth estimates
- Use of biomass maps: integration with NFIs continuous improvement and sustainability for national forest monitoring

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2019 Refinement of the IPCC GPG: use of biomass maps

- What is the potential use of biomass density 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
  - Direct estimation of biomass change (i.e. for Tier 3)
  - Verification purposes
- National "calibration" required, link with NFI efforts
- Need to consider uncertainties
- Little practical experiences

Surveys in Geophysics
https://doi.org/10.1007/s10712-019-09510-6

Check for updates

The Role and Need for Space-Based Forest Biomass-Related Measurements in Environmental Management and Policy

Martin Herold, et al. *[full author details at the end of the article]*

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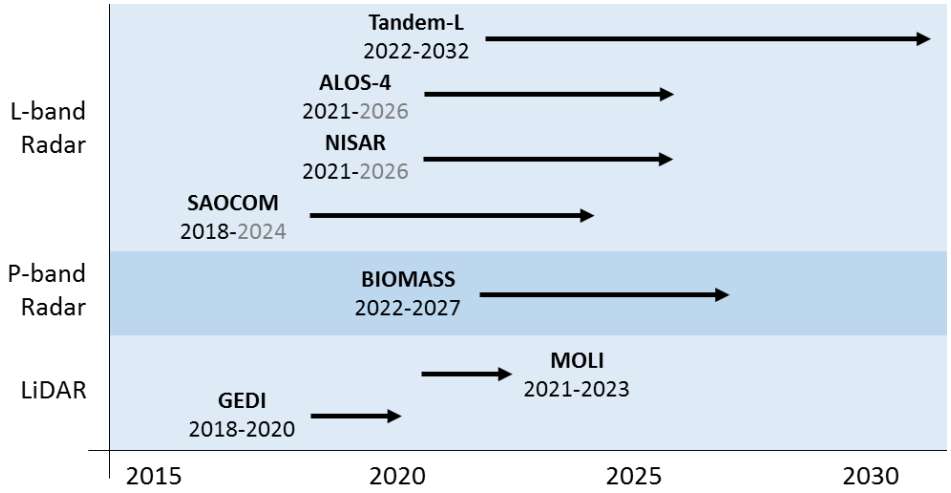

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esa
European Space Agency
Agence spatiale européenne

FOREST CARBON PARTNERSHIP FACILITY

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Recommendations to link with space-based biomass observation

Need of partnerships for joint initiatives and data exchange

- Modes of engagements between (global) biomass expert mapping community and country experts
- Develop a policy and mechanism for data sharing building upon the positive experience of the 2019 refinement

More practical country examples are needed

- Develop practical experiences, methods, training materials etc. on how biomass maps and other RS can improve national estimation following new IPCC guidance
- Aim to achieve country ownership in context of evolving opportunities

Approaches for continuous improvement and sustainability for national forest monitoring

- Concepts and tools for countries to generate better estimates (on their own) using existing and upcoming space-based data and enhance the efficiency and long-term sustainability of their NFI
- Use of maps and spatial data for climate mitigation policy development

Next generation services

- European Commission H2020 project www.reddcopernicus.info/
- Scoping a potential operational Copernicus forest monitoring service
- A questionnaire based on GFOI Criteria for consistently assessing levels of maturity (CALM)
- Survey: https://www.surveymonkey.com/r/ZQ9SP62
- Experts are asked to fill in the survey for a specific concept
- Overview of capacities and level of operationality: define service framework and R&D needs

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Remarks

1. Revised IPCC guidance for biomass and EF estimation (defaults, biomass maps) – scientific publications to follow
2. Develop practical experiences with countries for implementing new guidance, incl. uptake of new space-based biomass data and improve for emission/removal factors
3. More guidance and experiences to assess uncertainties of emission factors (GFOI), also towards propagating uncertainties in emissions and emission reductions

Special issue

remote sensing

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National REDD+ Monitoring and Reporting

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Deadline for manuscript submissions:
29 May 2020

Message from the Guest Editors

Requirements for REDD+ related forest monitoring are evolving and consolidating in terms of the types of information required, monitoring frequency, accuracy and transparency. While several performance-based REDD+ frameworks are moving forward, different methods, tools and frameworks for monitoring and reporting are maturing for use by national and other REDD+ stakeholders.

This Special Issue will focus on national to local case studies, covering tropical humid and dry forest domains, which focus on different monitoring targets (area change, forest degradation, carbon stocks, burned area, forest types and biodiversity), using novel methods for the analysis of satellite data, and showcasing how they evolve from research to operational use in country contexts. The use of open methods and free data (such as Copernicus data) is preferred and should be explored. In addition, general contributions that discuss reporting requirements and needs related to international, national and local implementation frameworks are welcome.

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