GEO-TREES

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March 27th, EEBIOMASS webinar

Context

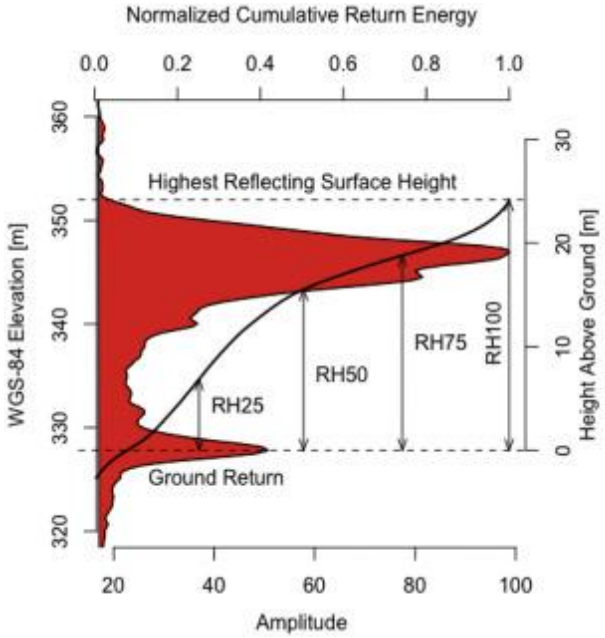
Locking up carbon in forests may, in some conditions, be an affordable strategy for mitigating carbon emissions

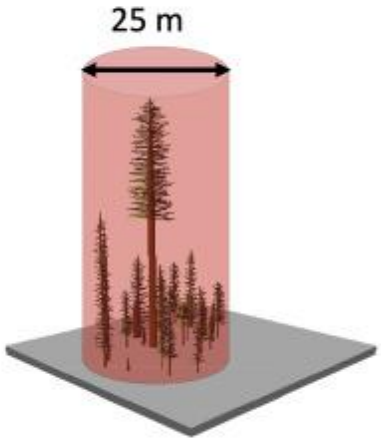
But there are risks:

- Forests are vulnerable (insects, wildfires)
- The forest sector is exposed to rapid shifts in the global economy
- Confidence in forest carbon credits is low

Global forest biomass monitoring is crucial

The GEDI mission





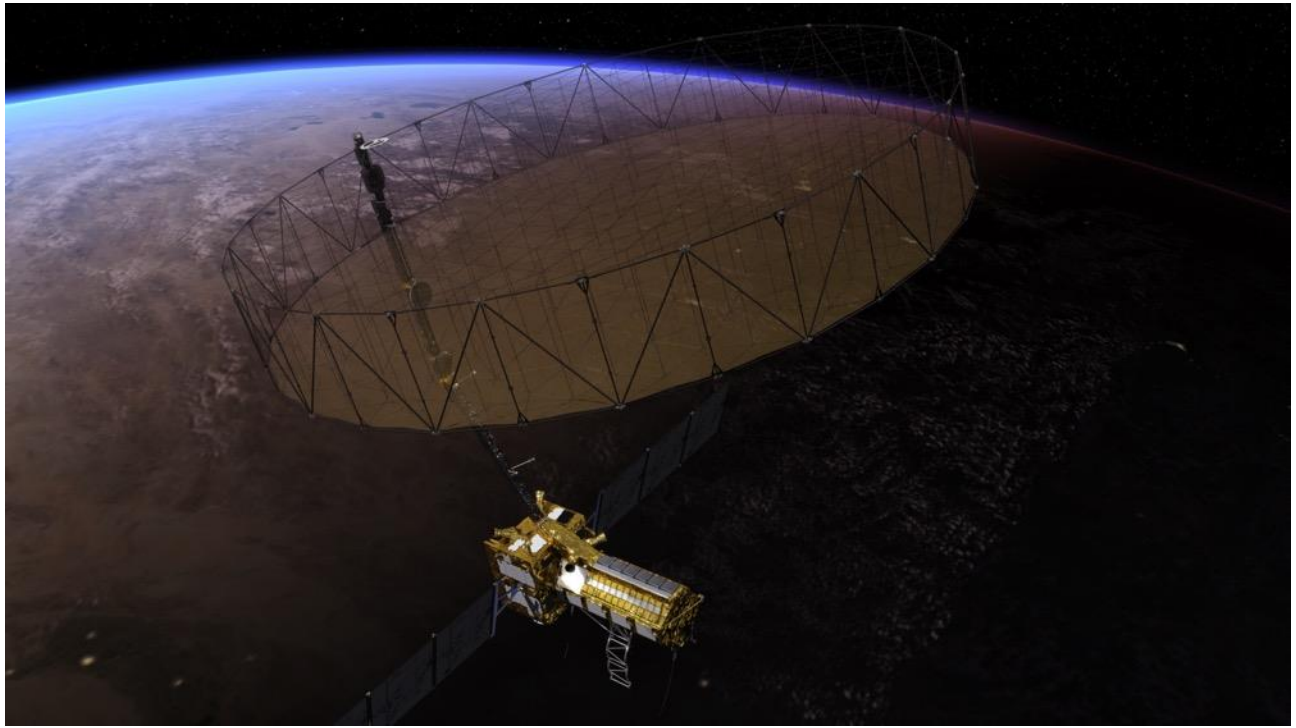
GEDI
ECOSYSTEM LIDAR

Launched December, 5th 2018

https://geo-trees.org

Dubayah et al. Remote Sensing Envir (2022)

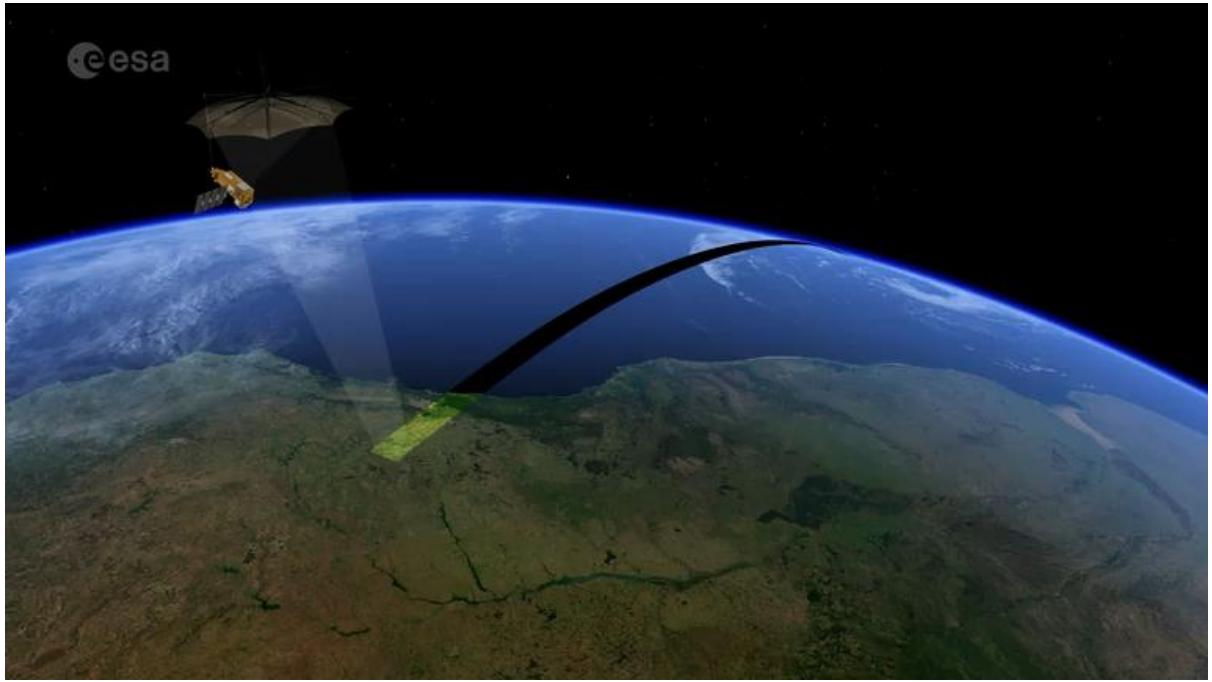
The NISAR mission



NISAR
NASA - ISRO SAR Mission

To be launched May 2025?
Paul

The BIOMASS mission



To be launched April, 29th 2025

Diversity of biomass distribution in forests

Lopé National Park, Gabon

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Diversity of biomass distribution in forests

Zhangjiajie National Forest Park

https:

Diversity of biomass distribution in forests

GEO-TREES: Rationale

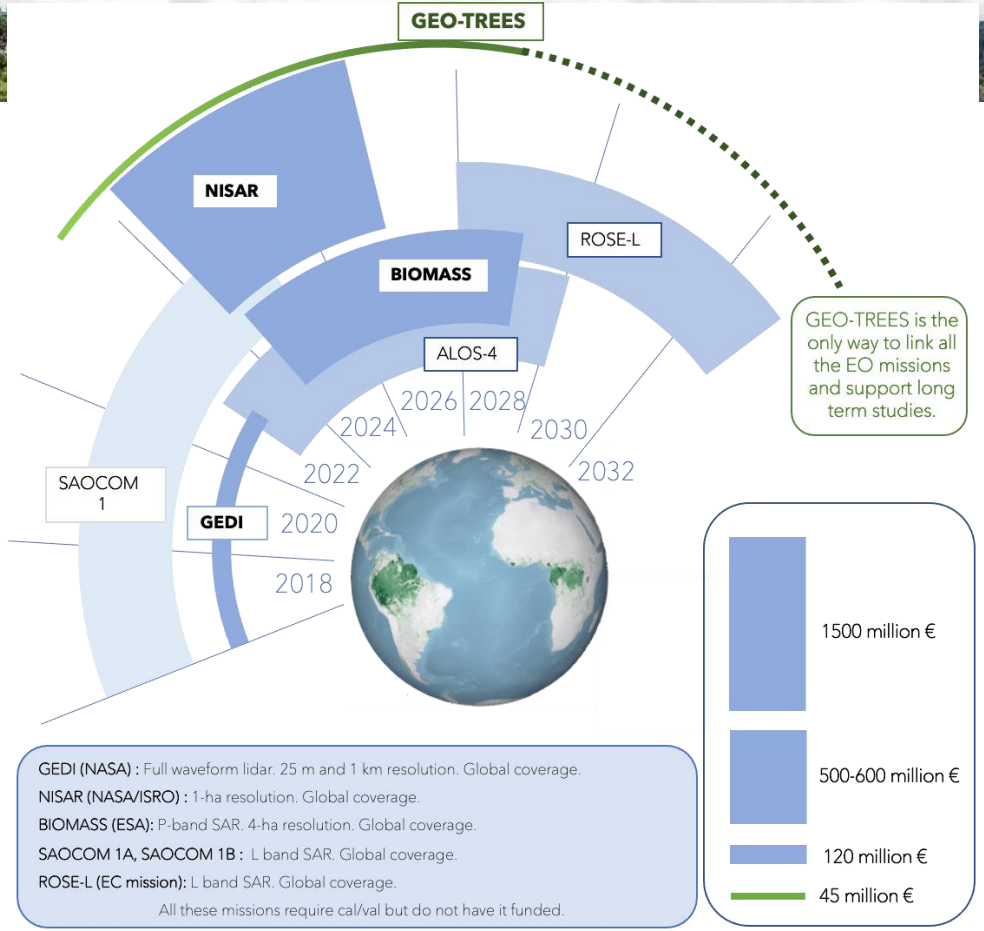
- **Three satellite Earth Observation missions** … but none of them measures biomass, they are all based on indirect estimation
- Ground data is essential for validation of global biomass products
- Ground data acquisition is the **4th Earth Observation mission**
- Collectively, we need to ensure that **long-term permanent plot monitoring sites**, and international networks, are sustainably staffed and funded to provide these data

GEO-TREES: Goal

GEO-TREES is an equitable and sustainably-funded system of recurrent site-based measurements that will serve as a lasting interface between the Earth Observation agencies and ground-based tree-by-tree measurement initiatives.

This infrastructure is designed to become **a common good for the entire EO community and beyond**.

How much does a 4th mission cost?



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Technology

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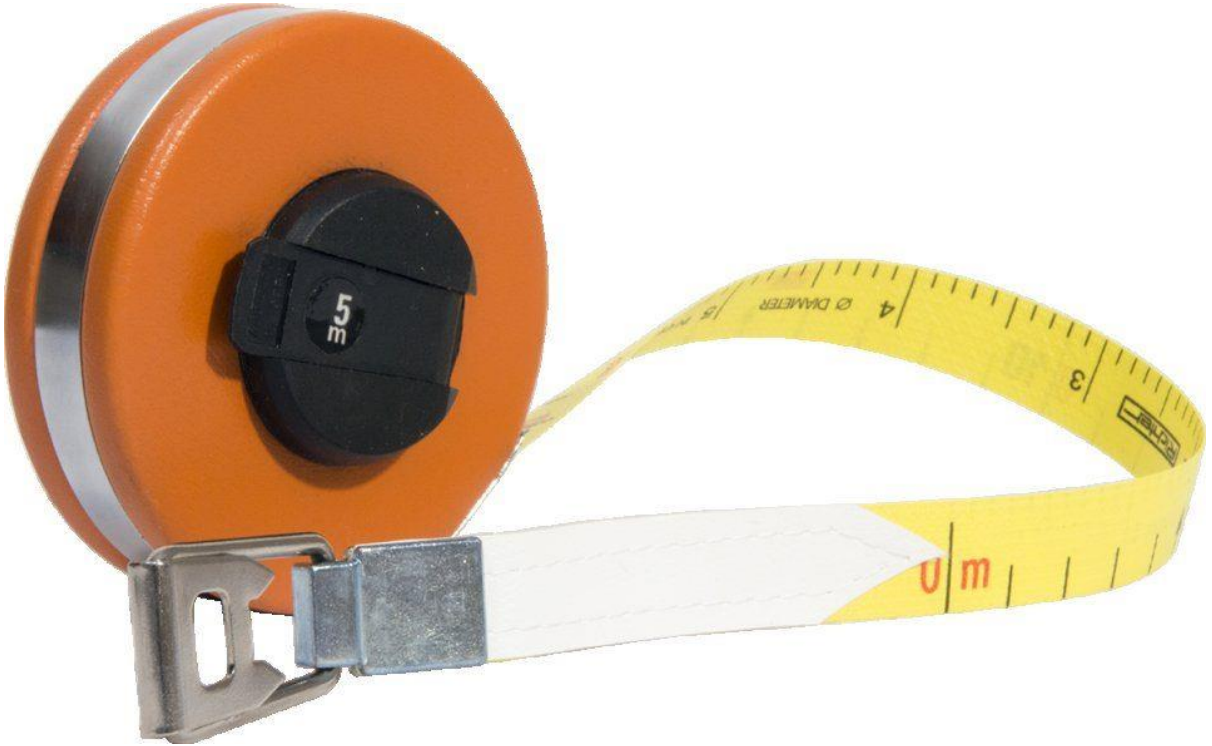
Technology



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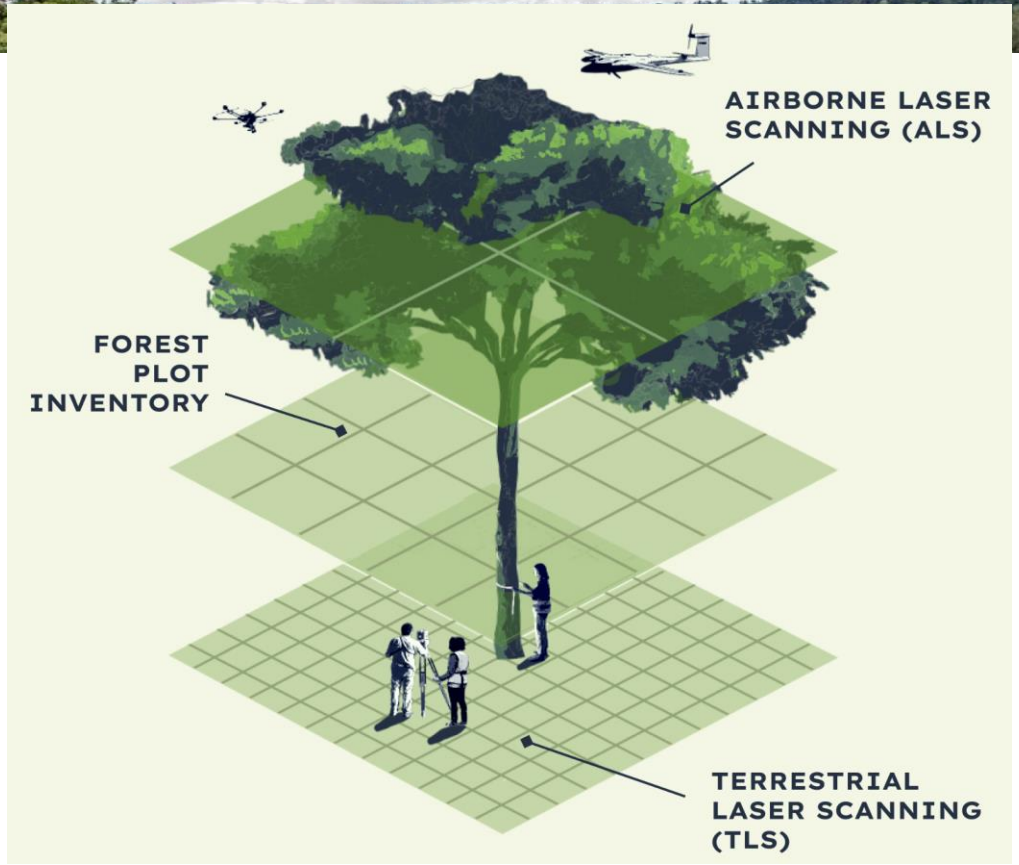
GEO-TREES: Activities

- Focus on 100 Biomass Reference Measurement sites representing the global forest typology (+210 lighter sites)
- Establish reference documents for measurement, storage and processing of data
- Combine several streams of data: (i) permanent forest inventory, (ii) airborne laser scanning, (iii) terrestrial laser scanning
- Engage with the international community through in person meetings, training opportunities, and scientific projects

Biomass Reference Measurement sites



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Biomass Reference Measurement sites

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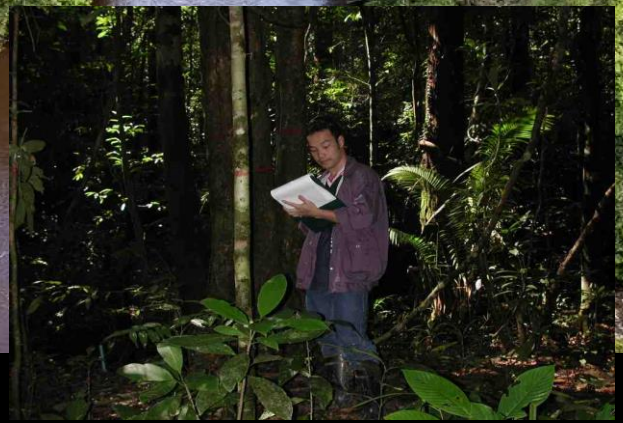
	Permanent forest inventories (> 10 x 1ha)	Airborne laser scanning (> 1000 ha)	Terrestrial laser scanning (3 x 1ha)
			
Delivrables	Create high-quality **geolocated** AGBD estimates at 0.25 ha scale **using allometric model**	Upscale plot information over landscapes **using locally calibrated AGBD-height model**	Validate locally fitted AGB models Provide reliable tree height values

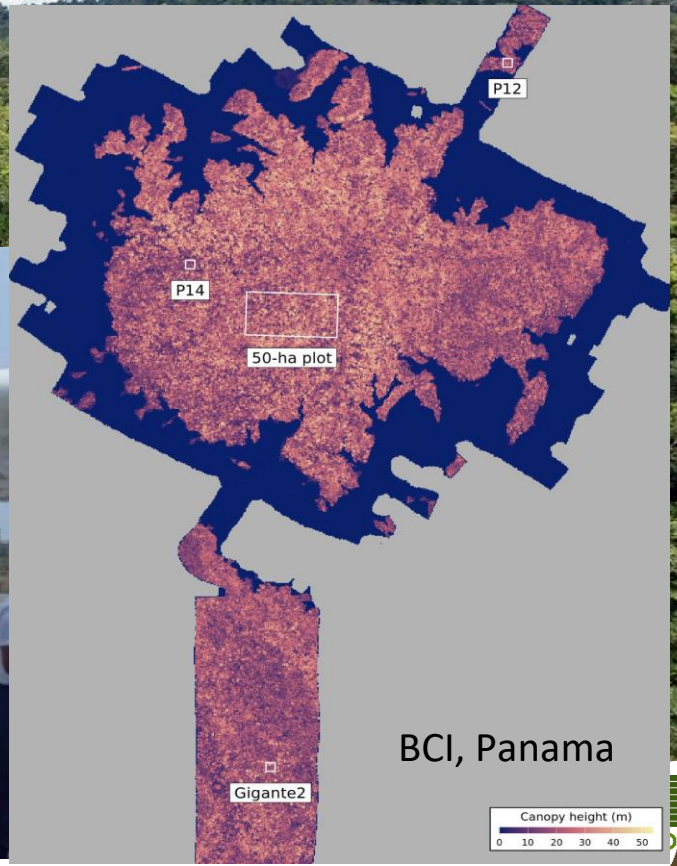
GEO-TREES measurements: Ground plots (10-hectares per site)

Create high-quality geolocated AGB estimates at 0.25-ha scale using a local allometric model



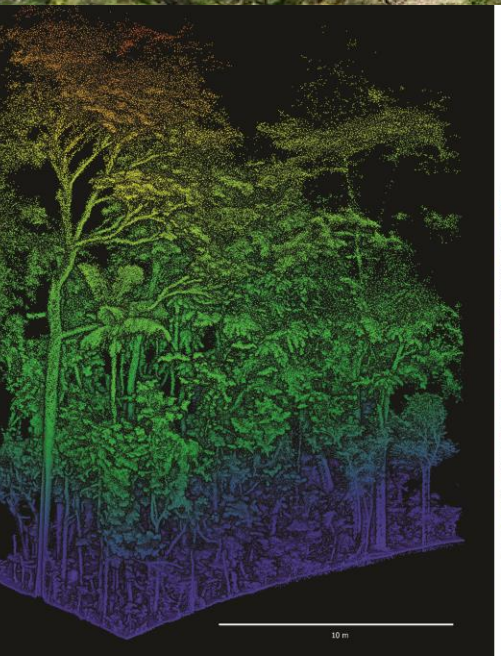
GEO-TREES measurements: Airborne Laser Scanning

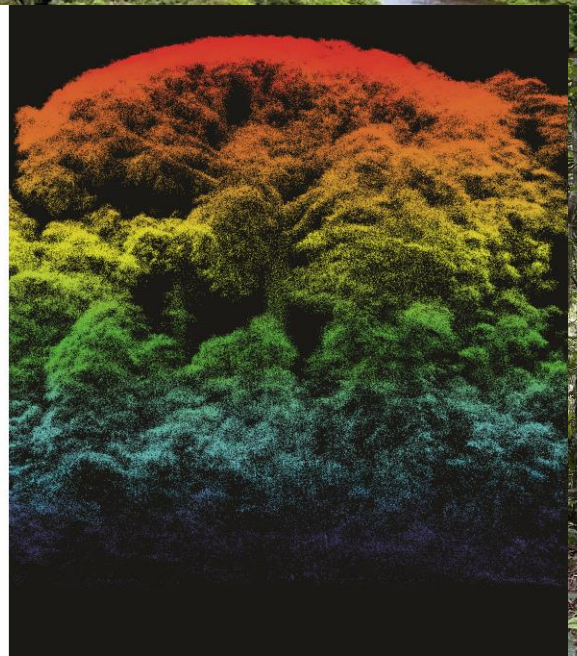
>1,000 hectares per site
Upscale plot information over landscapes using locally calibrated AGB-height model



GEO-TREES measurements: Terrestrial Laser Scanning

Survey 3 one-hectare plots at each site – representing local AGB variation





Above ground biomass validation protocol

Committee on Earth Observation Satellites

CEOS Working Group on Calibration and Validation
Land Product Validation Subgroup

Aboveground Woody Biomass Product Validation

Good Practices Protocol

Version 1.0 – 2021

Editors: Laura Duncanson, Mat Disney, John Armston, David Minor, Fernando Camacho, Jaime Nickeson

→ Consistent with IPCC Guidelines
→ accessible online

Guidance for:
Map producers on how to estimate, propagate and report errors

Map users on how to interpret errors:

- How to collect reference data (field and airborne lidar)
- How to use reference data to conduct independent biomass product validation

Summary of:

- State of knowledge of biomass mapping
- Community identified research and tool development priorities
- Recommendations for protocol implementation

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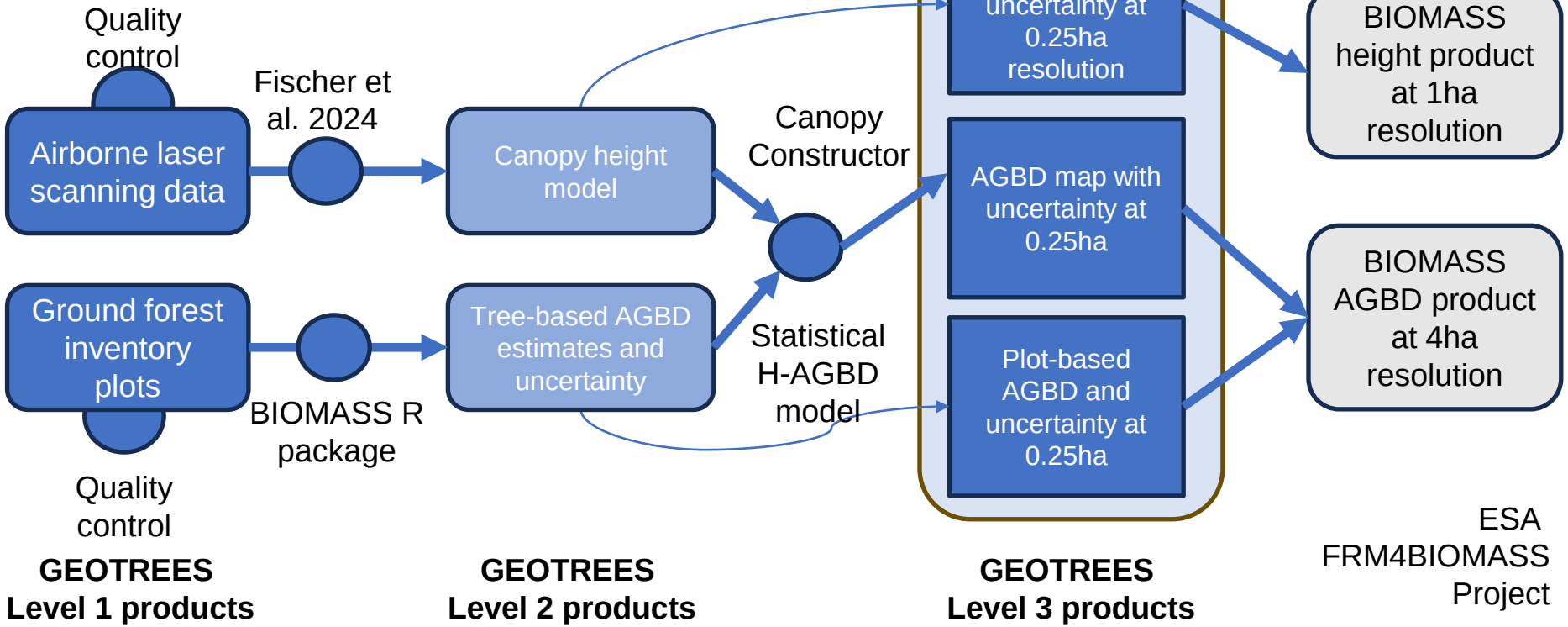
Processing data



ESA FRM4BIOMASS Project

Multi-Mission Algorithm and Analysis Platform (**MAAP**)

Technical Implementation Groups

Permanent forest inventories

Genoveva Gatti
CONICET, Argentina

Euridice Honorio Coronado
University of St Andrews, UK

Airborne laser scanning

Laura Duncanson
University of Maryland, USA

Tommaso Jucker
University of Bristol, UK

Terrestrial laser scanning

Mathias Disney
University College London, UK

Helene Muller-Landau
Smithsonian Institution, USA

Training

- GEO-TREES actively invests in the training and career development of scientists
- This includes training programs in remote sensing and Earth observation

ForestGEO workshop 2019, Singapore

Building on existing networks

TmFO

… and many other projects

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Establishing trusted partnerships – an on-going activity

SUPPORTING PARTNERS

Progress: African & American GEO-TREES sites

https://geo-trees.org

Asia and Oceania GEO-TREES sites

https://geo-trees.org

GEO-TREES: Foster Collaboration, Share the Cost

Looking forward to

working with you all!

Jérôme, Klaus, Stuart, Alvaro,

Beatriz, Oliver, Camille, Irié

GEO TREES

ขอบคุณ !

Thank you!

Matondi !

¡Gracias!

धन्यवाद !

Asante!

Terima kasih!

Cảm ơn !

Akpe !

Obrigado!

谢谢 !

Merci!

நன்றி !