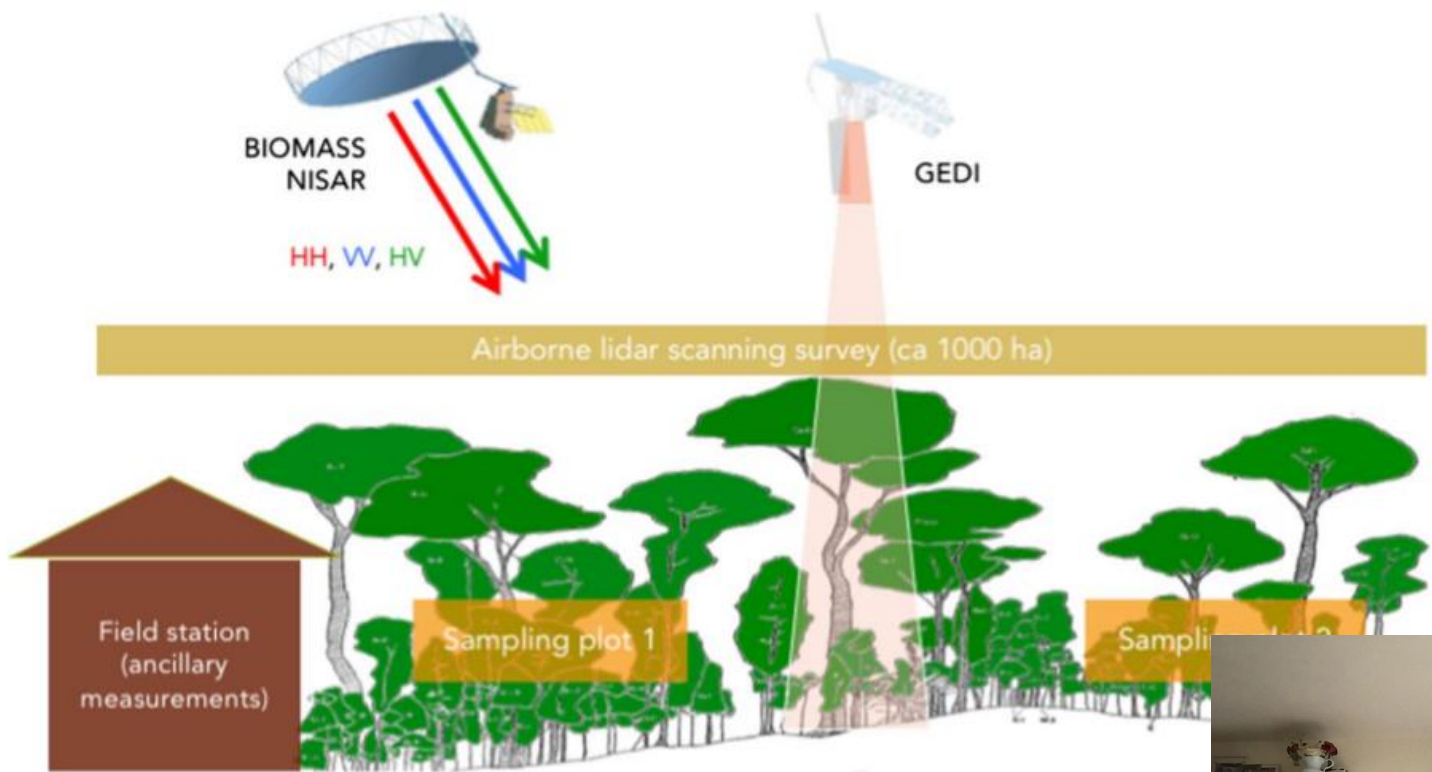
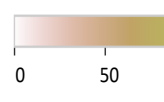
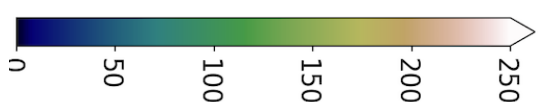
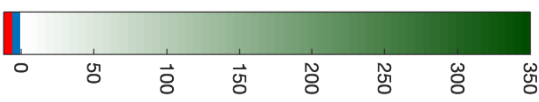
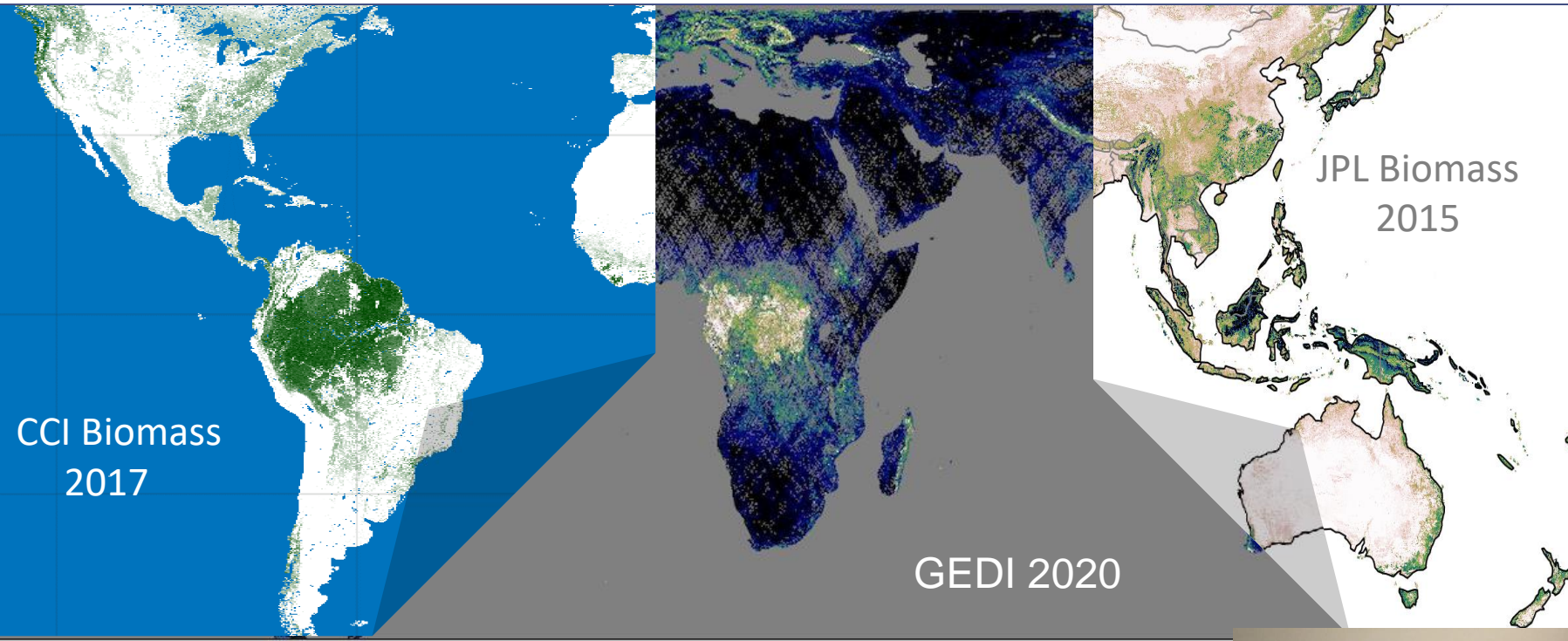


# GEO-TREES: A forest biomass reference system from tree-by-tree inventory



# Many data one goal – need for validation



Aboveground Biomass (Mg/ha)



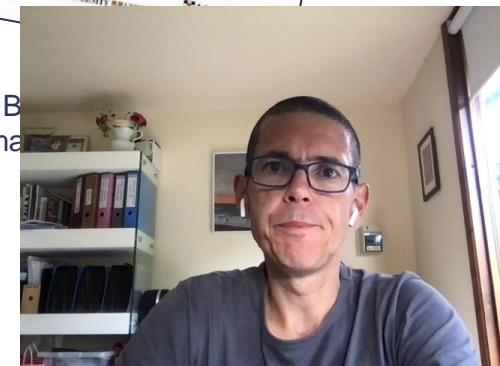
# Recommendations from CEOS Biomass Protocol

1. EO products require independent and **traceable validation**.
2. EO product validation requires, **large forest plots (>1ha)** complemented by **airborne and terrestrial/UAV lidar**.
3. All reference data should be **free and open**.

[https://lpvs.gsfc.nasa.gov/PDF/CEOS\\_WGC\\_V\\_LPV\\_Biomass\\_Protocol\\_2021\\_V1.0.pdf](https://lpvs.gsfc.nasa.gov/PDF/CEOS_WGC_V_LPV_Biomass_Protocol_2021_V1.0.pdf)

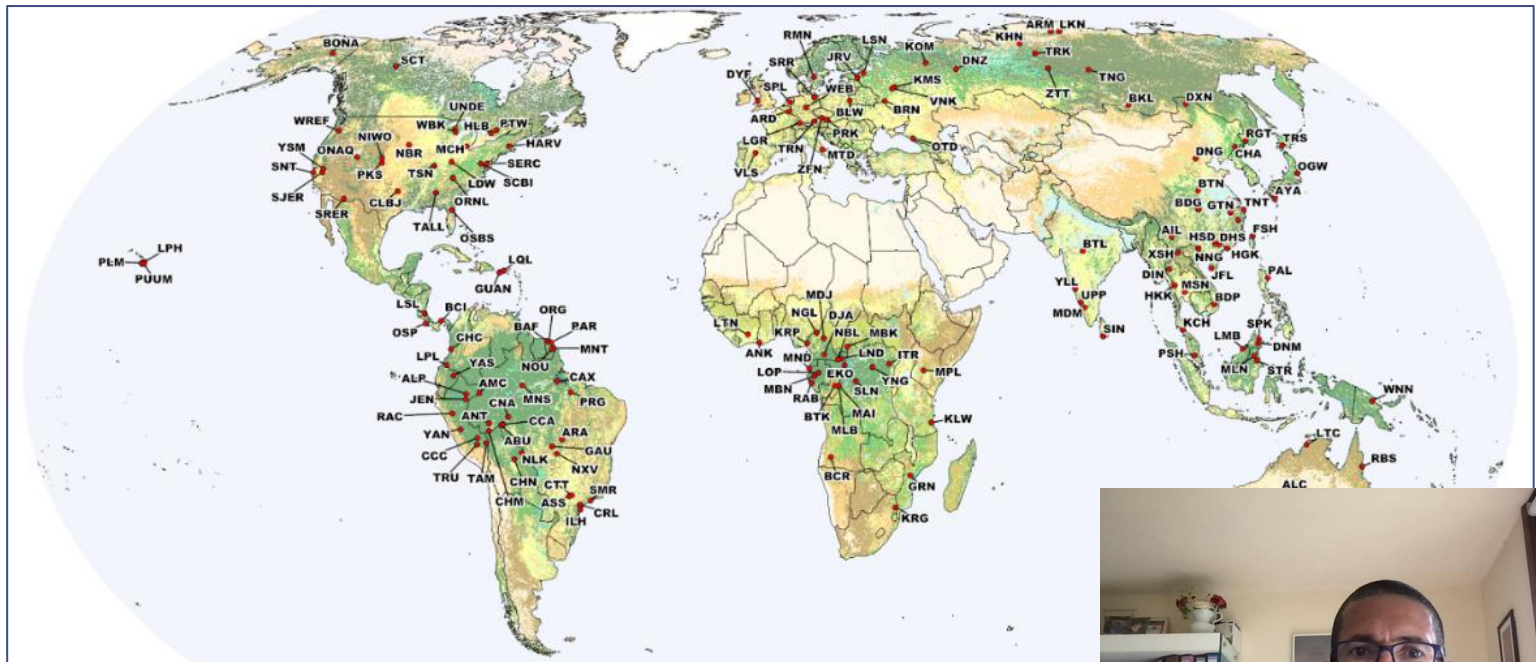


CEOS LPV Cal/Val Biomass  
Above Ground Biomass



# Global Forest Biomass Reference System

1. Establish a **Global Forest Biomass Reference System** as an **equitable** and sustainably-funded system of recurrent site-based measurements **building on existing initiatives**.
2. As no single EO Mission, Agency or Organization alone can establish and maintain such a system **share the cost**.



J. Chave et al., Biomass Validation Strategy Document



# GEO-TREES in a nutshell

## Rationale

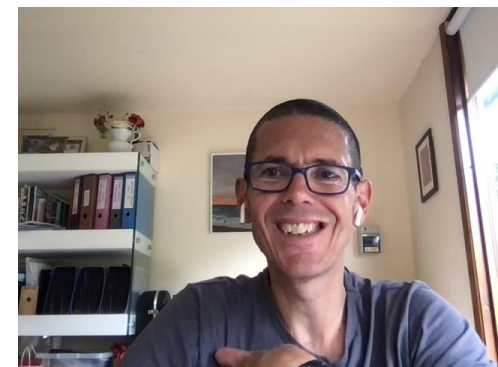
- Need to validate Forest Biomass EO products.
- EO requires special data that is usually not collected by ecologists.
- Collecting and sharing data requires funding and coordination

## Goal

- Get funding for an equitable and sustainable system of recurrent site-based measurements
- 100 core sites (+210 opportunity sites)
- Database of in situ tree by tree data complemented by airborne and terrestrial lidar scans

## 1<sup>st</sup> yr Activities

- Establish the Activity (write the Governance, define the 1<sup>st</sup> year objectives, set up a Project Secretariat, etc.)
- Reach out to potential funding partners and agencies
- Link to GFOI and GEOBON



# Building on existing networks



... and many other projects

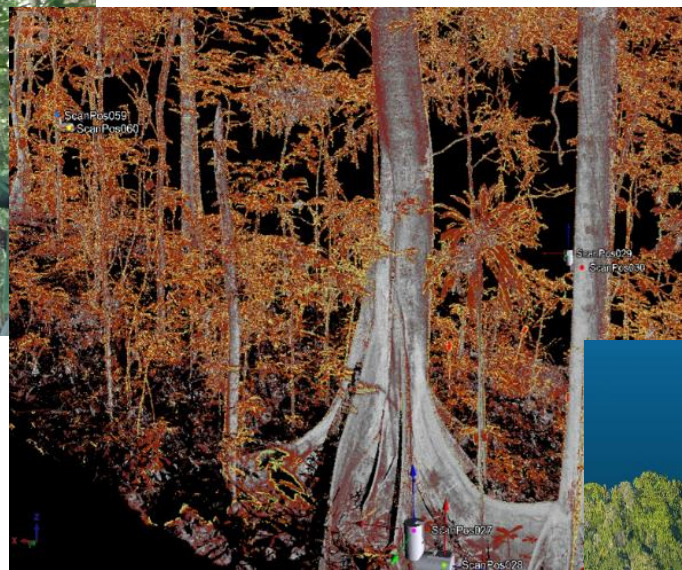


# Complementing census data

## Classical forest census



Terrestrial/UAV lidar



Airborne lidar



# Forest Observation System – sharing data openly

The screenshot shows the Forest Observation System website. At the top, there is a navigation bar with the logo and menu items: MAP, ABOUT, NEWS, CONTRIBUTE, DATA PACKAGE, RESOURCES, CODE OF CONDUCT, and CONTACTS. Below the navigation bar is a world map with several red circular markers indicating forest observation plots. A legend titled 'Biomass maps legend:' is located at the bottom left, showing color-coded ranges for biomass density (Mg dm / ha): 1 - 20 (yellow), 21 - 50 (orange), 51 - 100 (light orange), 101 - 150 (orange-red), 151 - 200 (red), 201 - 300 (dark red), 301 - 400 (magenta), and 401 - 500 (dark magenta). To the right of the map, there is a 'PLOT INFORMATION' section with the text 'Click on a plot in the map on the left hand side to load and visualize its data.' Below the map, there is a 'DOWNLOAD DATA' section with the text 'Only logged in users are allowed to download.' and a 'Log in' button.

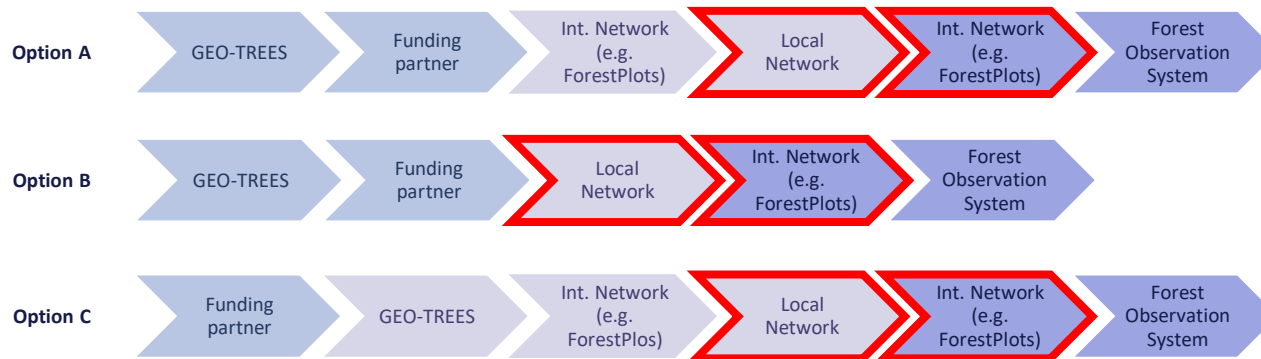
Schepaschenko et al. 2019. The Forest Observation System, building a global dataset for remote sensing of forest biomass. *Scientific data*, 6(1), pp.1-11





# GEO-TREES funding mechanism: possible routes?

1. GEO-TREES is a **coordination activity**.
2. GEO-TREES should **link funding partners and plot networks and ensure a harmonized data acquisition and transfer**.
3. Funding partners can be International Organizations, Governmental Organizations, Space Agencies, Foundations, Commercial etc.
3. Funding mechanism:



### Pros & Cons

- 1. Small GEO-TREES overhead
  - 2. Funders deal with one, established partner
  - 3. Experience of Int. Network available from the start
  - 4. Funding of Data curation by Int. Networks implicit
- 
- 1. Small GEO-TREES overhead
  - 2. Funding partners can deal with Local Networks directly (e.g. for in-country investments)
  - 3. Funding partners needs to enforce data standards
  - 4. Funding of data curation by Int. Networks not implicitly included
- 
- 1. Can be applied to both Option A & B
  - 2. Large
  - 3. Otherw



# Where are we

1. Activity accepted in March 2021 for the 2021-2022 GEO work programme

## 2. People behind GEO-TREES:

- Jerome Chave (Laboratoire Evolution et Diversité Biologique, France)
- Stuart Davies (Smithsonian Tropical Research Institute, USA)
- Mat Disney (University College London, UK)
- Laura Duncanson (University of Maryland, USA)
- Martin Herold (Wageningen University, NL)
- Nicolas Labrière (Laboratoire Evolution et Diversité Biologique, France)
- Oliver Phillips (University of Leeds, UK)
- Shaun Quegan (University of Sheffield, UK)
- Sassan Saatchi (Jet Propulsion Laboratory, USA)
- Plinio Sist (CIRAD, FR)
- Dmitry Schepaschenko (International Institute of Applied System Analysis, Austria)
- Klaus Scipal (European Space Agency, Italy)

## 3. First Achievements

- CNES committed to fund a project office for two years
- ESA ForestScan activity kicked off to set up three reference sites (French Guiana, Gabon, Malaysia).
- First discussions with Third Parties.



# Foster Collaboration, Share the Cost (and the data!)



Thank You! The GEO-  
TREES team

Collaborate and c

