

CCI Biomass

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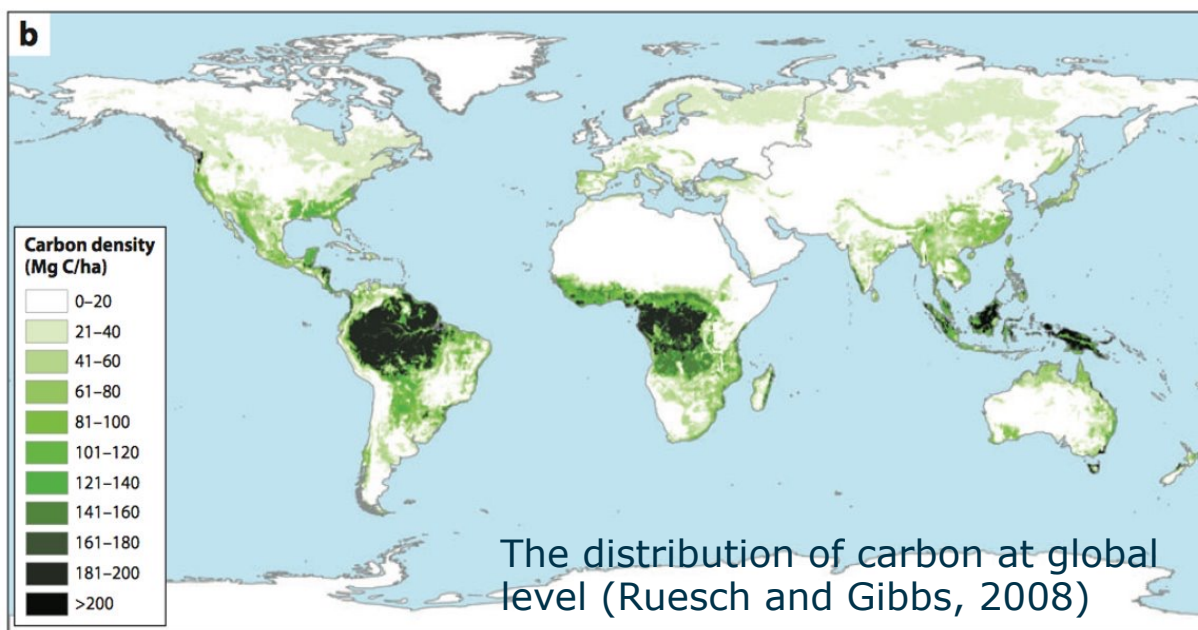
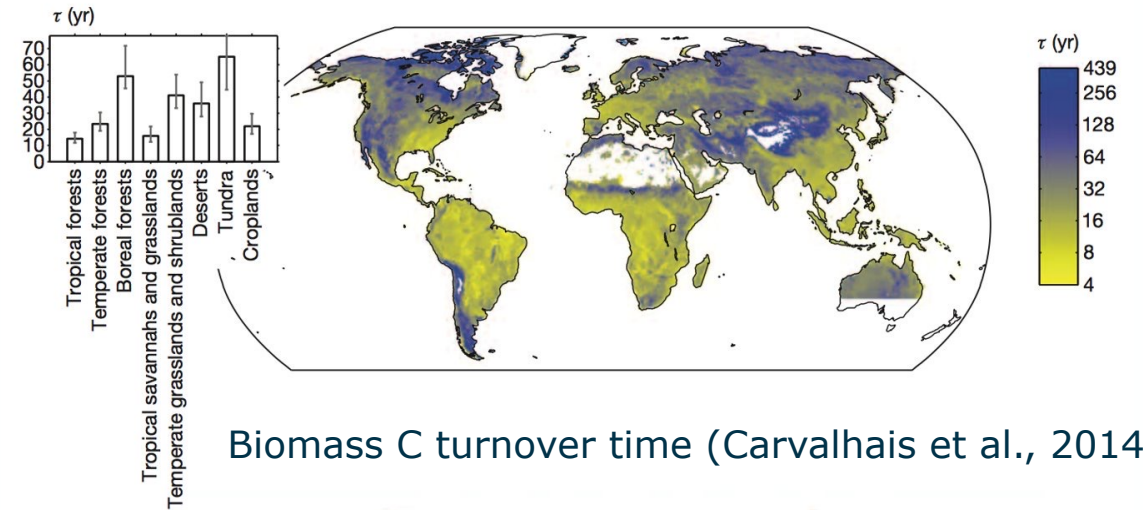
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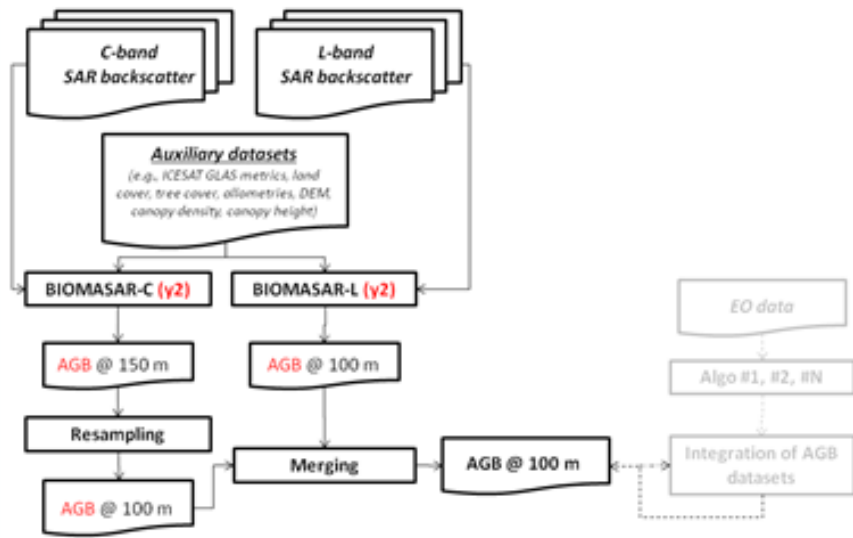
THE ROLE OF BIOMASS IN CLIMATE

- Carbon (C) storage
 - Atmospheric CO₂ absorbed by growing plants
 - Stored in biomass & soil carbon pools
 - Highly sensitive to land use and management
- C emissions
 - Biomass loss in land use change second only to FF as a driver of rising atmospheric CO₂
 - Biomass fuel load controls fire emissions



- Provides information on C residence time and C dynamics due to change and disturbance.
- Enables initialisation of C cycle and coupled climate models and testing of process-oriented ESMs
- Biomass changes constrain carbon budgets (e.g., in the Paris Agreement process)

BASIC PRINCIPLES OF CCI BIOMASS (AGB) MAPS



- Combines SAR C-band (Envisat ASAR for 2010 and S-1 for 2017, 2018 and 2020) and L-band (PALSAR-1 for 2010 and PALSAR-2 for 2017, 2018 and 2020)
- Inverts semi-empirical model relating forest backscatter to canopy density and height.
- Model parameterisation is adaptive and does not use *in situ* observations (e.g. plot data)

Additional datasets used:

- Masking (e.g. CCI Land Cover)
- Calibration (e.g. Worldclim, ICESat-1 & 2, GEDI)
- Stratification (e.g. FAO Global Ecological Zones)

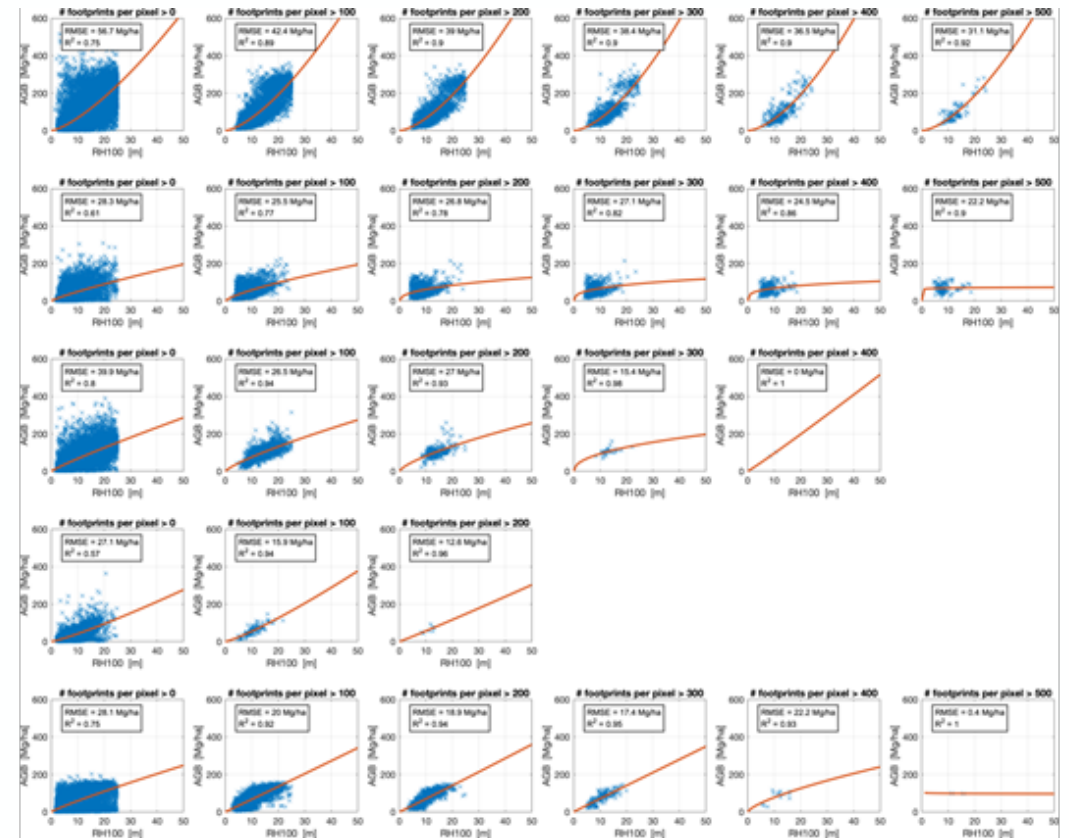
Tropical Wet

Tropical Dry

Temperate Wet

Temperate Dry

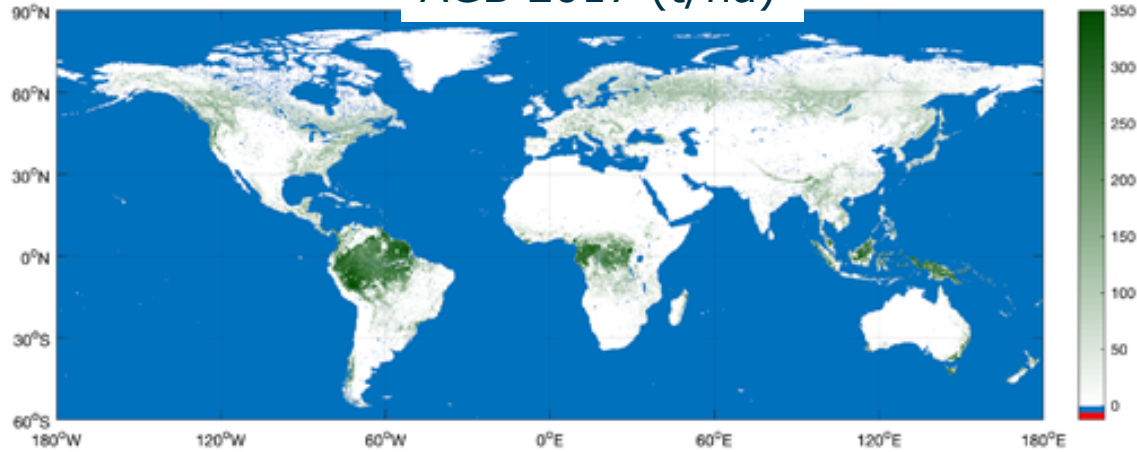
Boreal



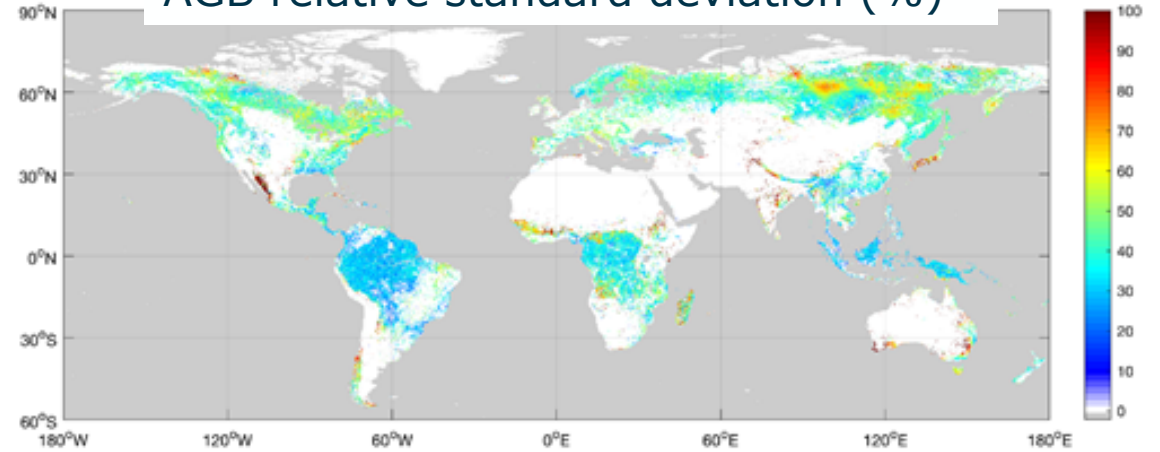
Relation of AGB to height (ICESat GLAS)

AGB MAPS PRODUCED FOR 2010, 17, 18 & 20

AGB 2017 (t/ha)



AGB relative standard deviation (%)



Estimation of change between years

At 100m

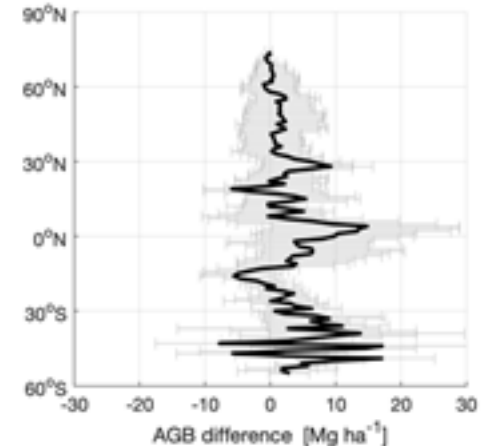
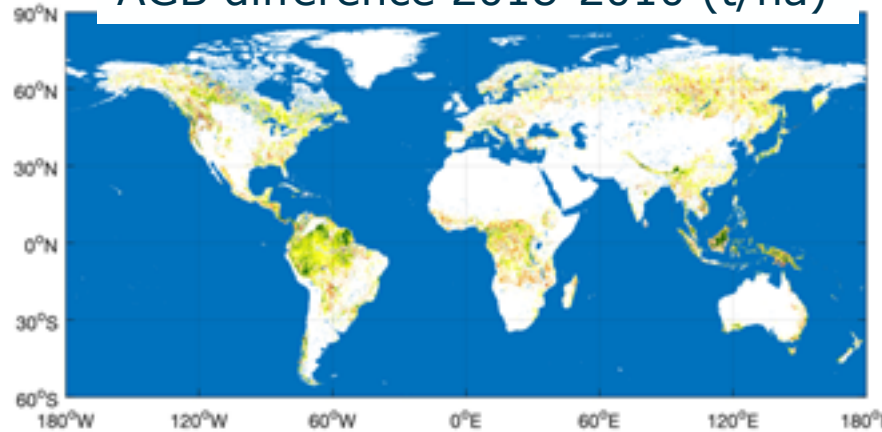
Different EO data for the 4 years causes biases in apparent changes in AGB.

Areas of concern in the AGB difference maps are indicated by quality flags.

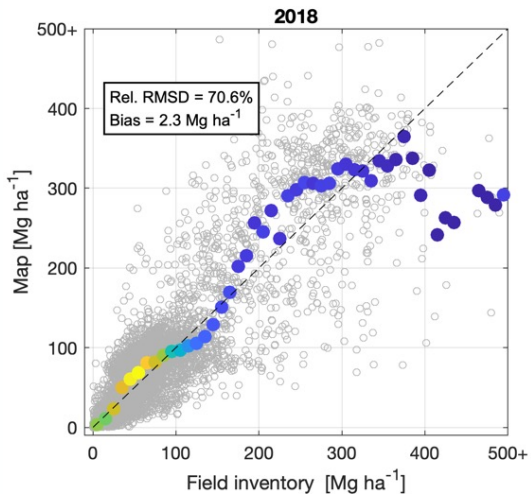
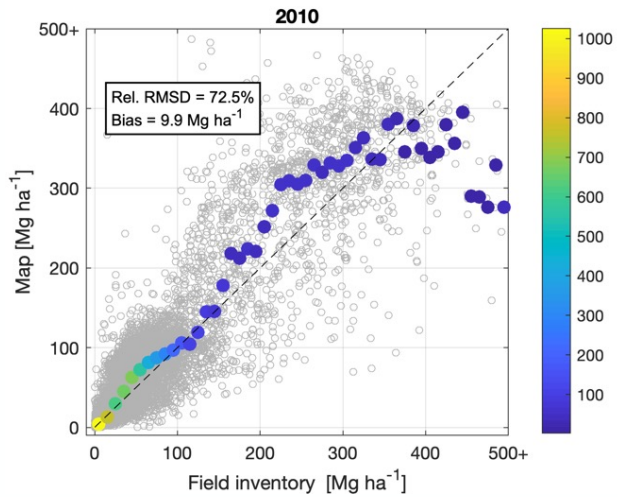
At 0.1°

Change has been calculated at 0.1° after applying bias correction

AGB difference 2018-2010 (t/ha)



AGB MAP VALIDATION THROUGH PLOT2MAP



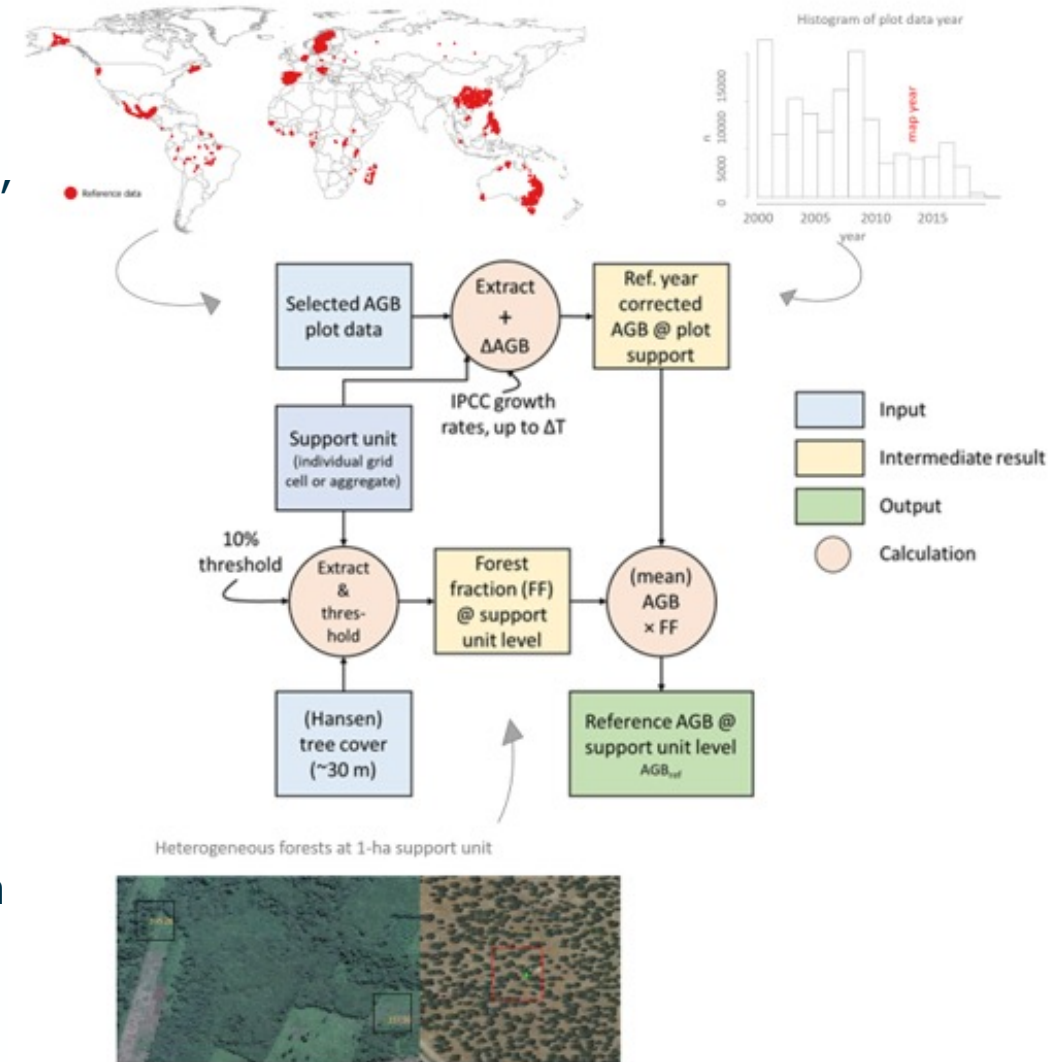
The Plot2Map tool allows systematic, consistent global/regional/national comparison between plot and map data.

It takes account of:

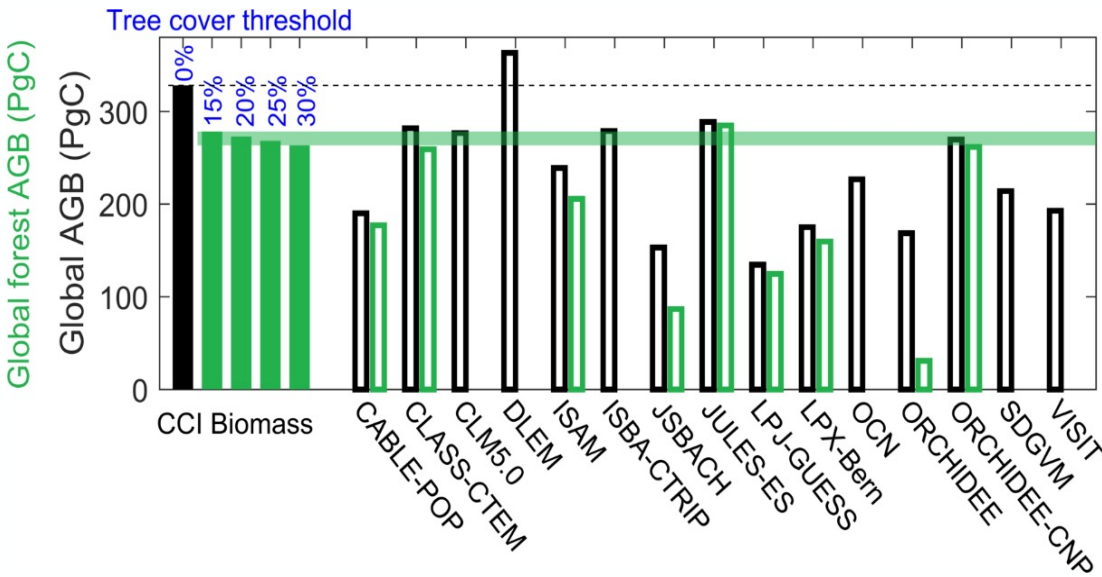
- Temporal mismatch
- Plot/pixel forest area mismatch
- Sampling error

Weaknesses

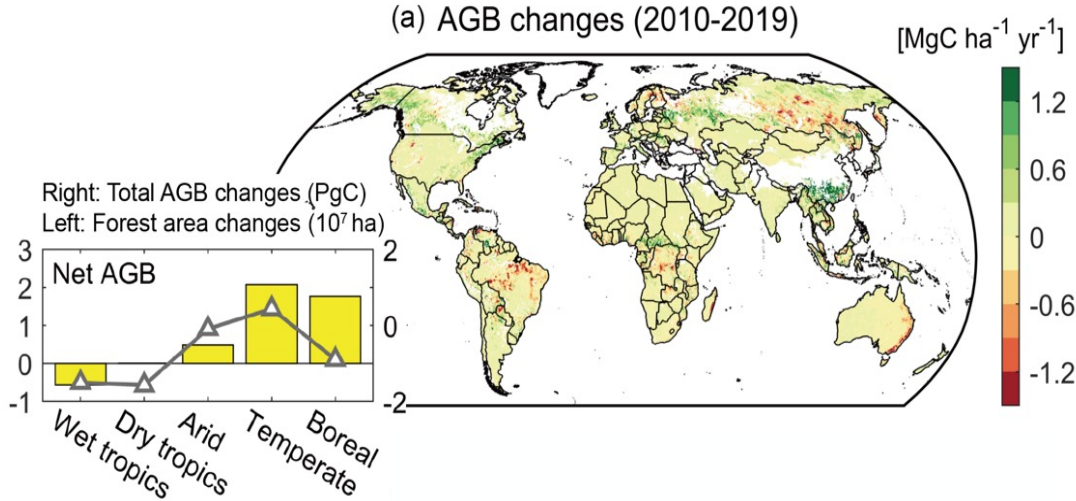
- Plots not designed for EO validation
 - Representation error
- Heterogeneous global distribution



EXPLOITATION OF CCI BIOMASS IN CLIMATE & CARBON CYCLE STUDIES



Global total AGB ca. 2017 for all plants (black bars) & forests (green bars) from CCI Biomass and Dynamic Global Vegetation Models in TRENDY dataset.



Spatial distribution of mean annual changes in AGB carbon between 2010 and 2019.

- Production of consistent annual maps from 2017 onwards
- Investigation of AGB products in the past (2015/16, 2005/6) to allow 5-year cycle of products
- Integration of new and upcoming datasets (e.g. GEDI, BIOMASS).
- **Change detection and bias & uncertainty assessment.**
- Continued collaboration with climate and carbon communities
- Linking with countries for UNFCCC reporting of NDCs
- International collaboration on AGB map harmonization (ESA/NASA/JAXA)

