Space-based Data for Biomass Mapping

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ESA Earth Observation Programmes

Biomass estimation from satellites in support of national Green House Gas reporting
SBSTA-50 Side Event | 20 June 2019 | Bonn

ESA Earth Observation

“Taking the Pulse of our Planet”

ESA-DEVELOPED EARTH OBSERVATION MISSIONS

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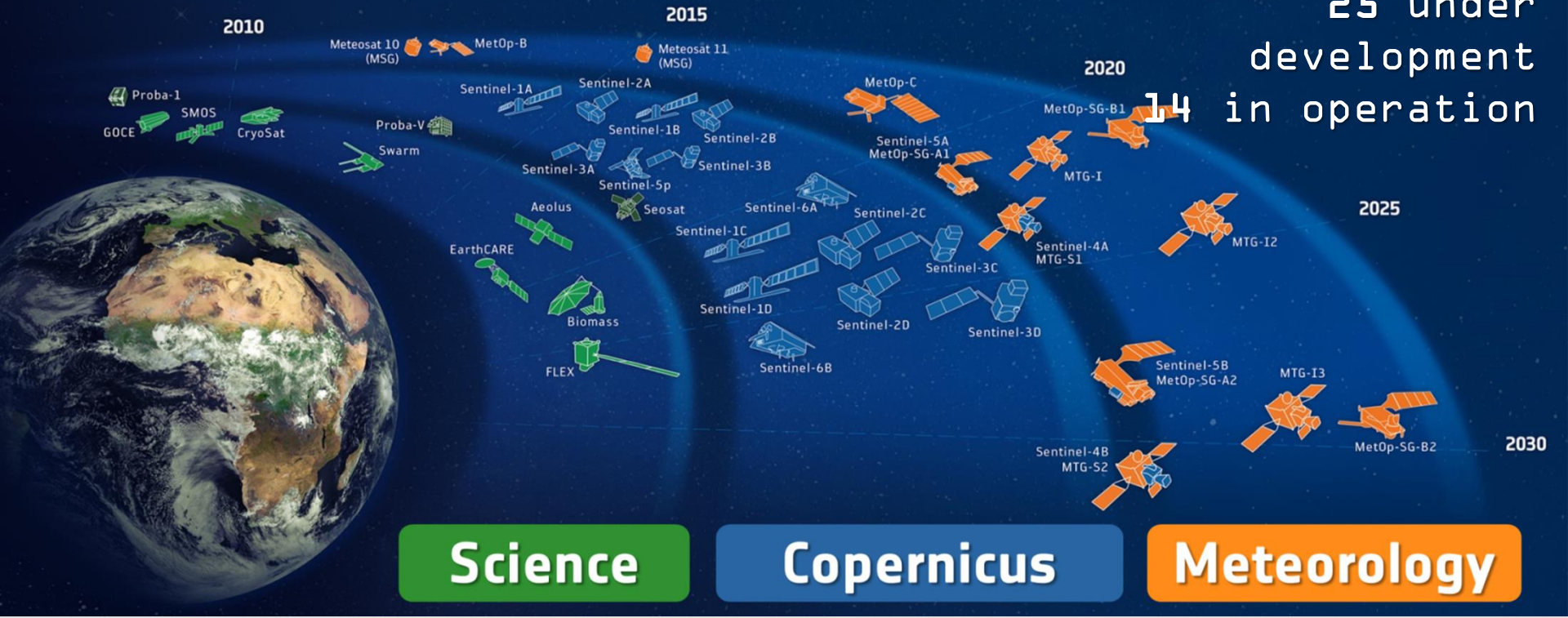
Satellites
25 under development
14 in operation



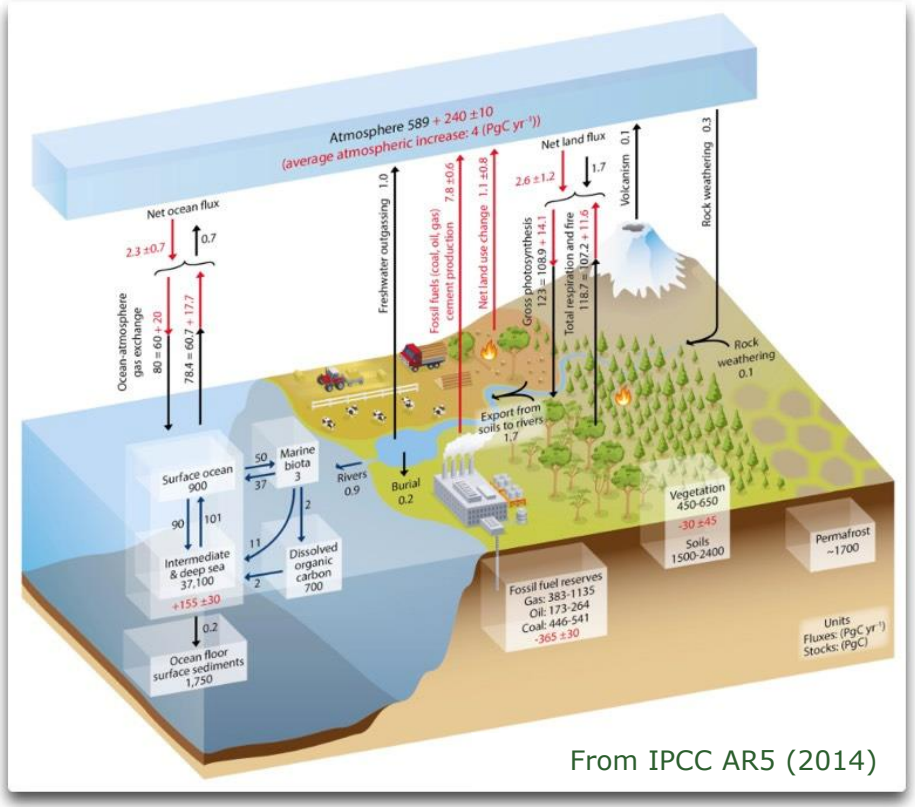
Science | **Copernicus** | **Meteorology**

Copernicus - A New Generation of Data Sources

- Copernicus is a European space flagship programme led by the European Union;
- Copernicus provides the necessary data for operational monitoring of the environment and for civil security;
- Copernicus consists of an in-situ, a space and a services component, where ESA coordinates the space component;
- Data policy: free and open access ➔ **https://scihub.copernicus.eu/**

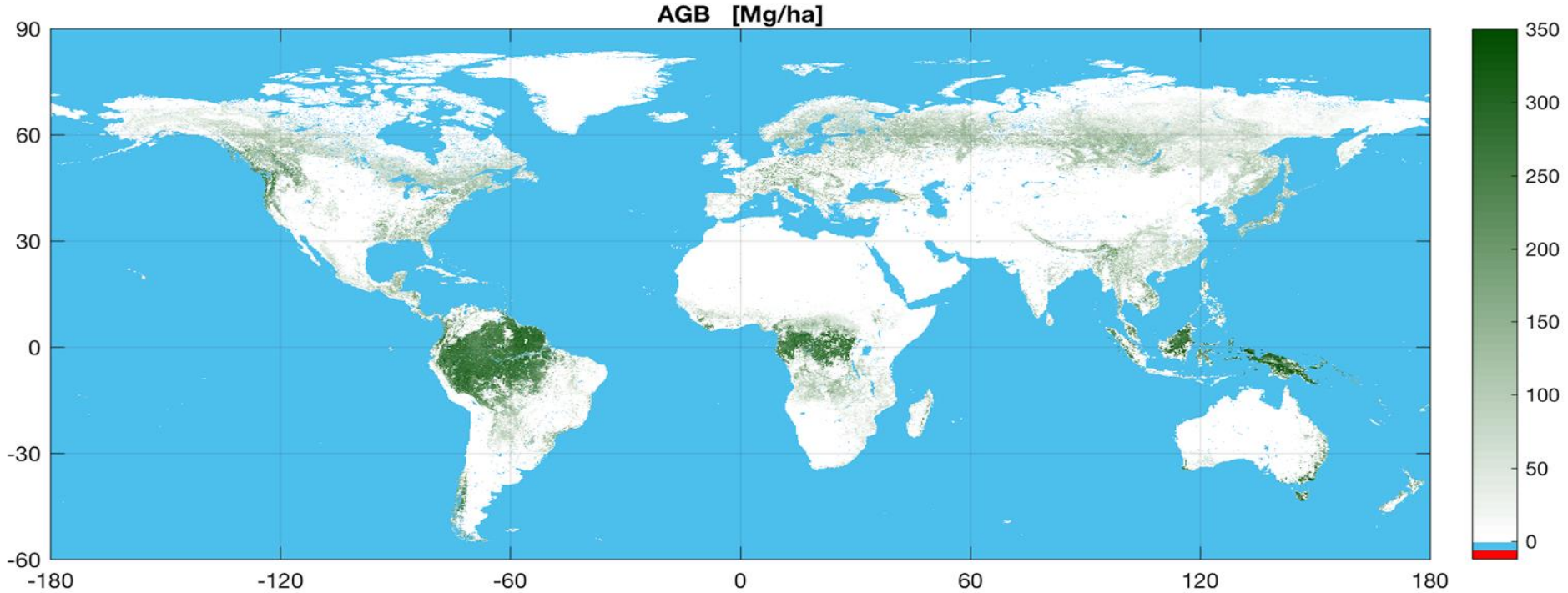
Why Biomass from Space?

- Terrestrial carbon stock
- Part of carbon cycle and input to climate models
- More specific biomass and emission factor defaults (IPCC guidelines)
- Better emission estimation
- Spatial explicit tracking of biomass changes



From IPCC AR5 (2014)

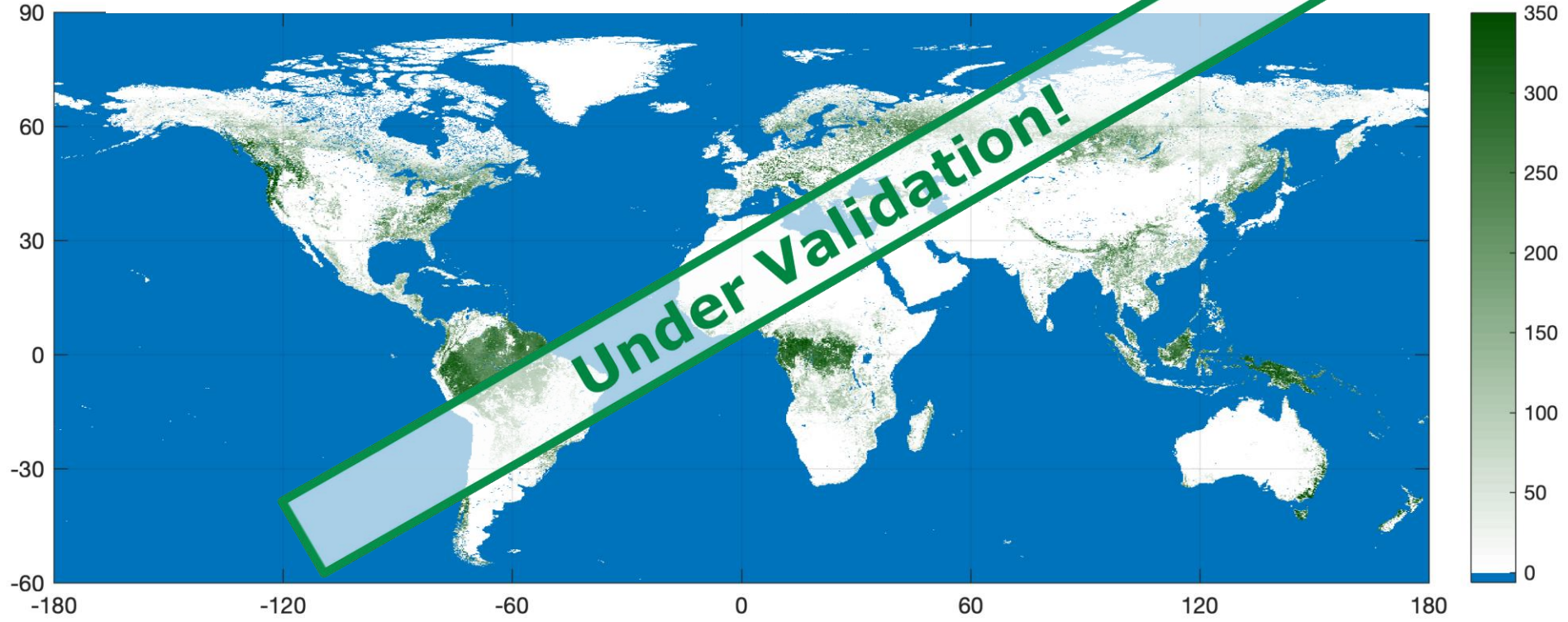
Global Biomass in 2010



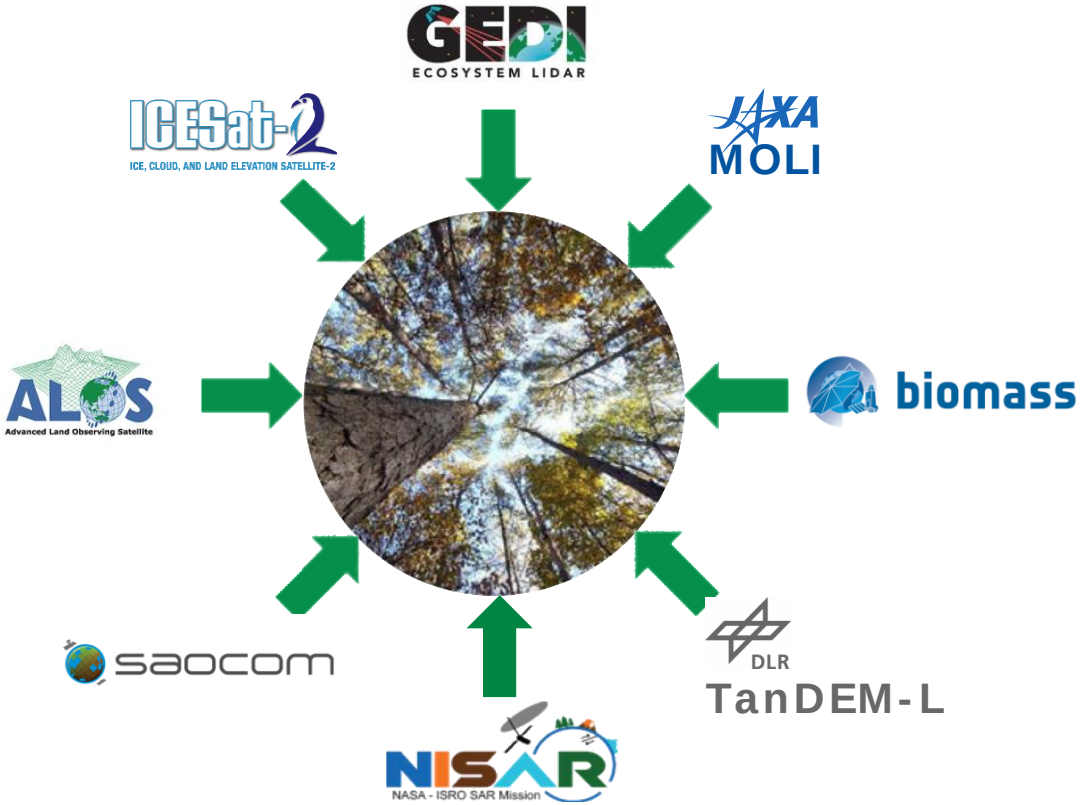
➔ http://globbiomass.org/products/global-mapping/

CCI Biomass 2017

Epoch 2017, AGB (Mg/ha) @ 100m

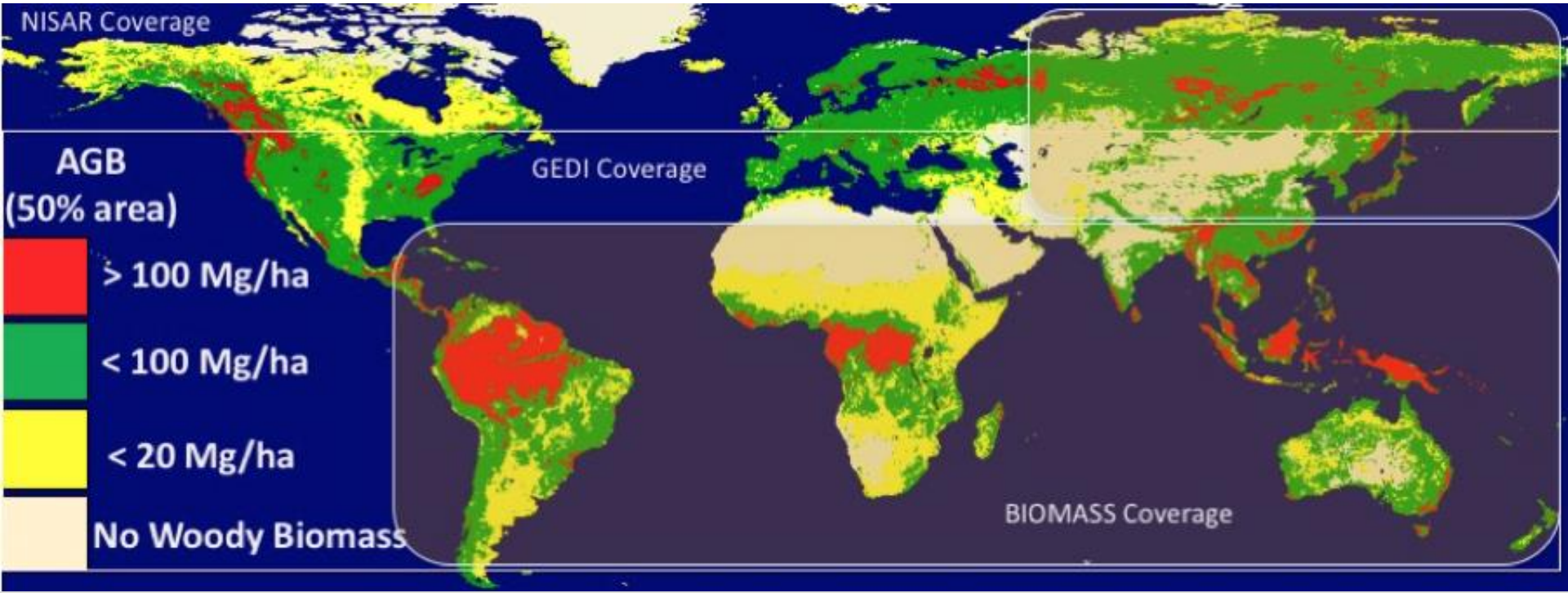


The "Golden Age" of Biomass Missions



Synergistic Forest Observations

NISAR: Global Coverage (similar SAOCOM, ALOS-4), sensitivity to AGB < 100 Mg/ha
BIOMASS: Tropical and East Eurasia Coverage, Sensitivity to AGB > 50 Mg/ha
GEDI: Sampling between 51.6° North/South (MOLI), Sensitivity to AGB > 20 Mg/ha



Biomass Coordination Framework

Data Component
(Country Needs Assessment, data accessibility, in-situ data, validation, country link and international policy link)

R&D
(Biomass Expert Meetings, funding opportunities for gap filling)

MGD
(Emission Factors, maturity assessment)

CB
(Capacity Building related to biomass estimation)

CEOS

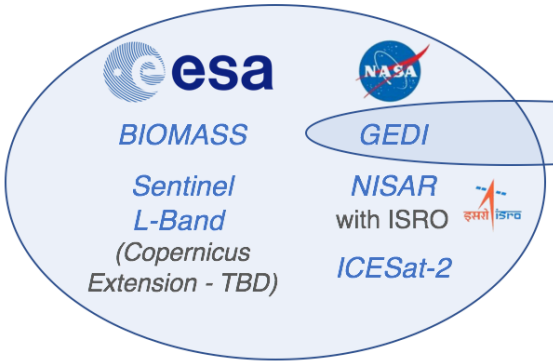
CARB-16
CARB-23

LSI VC: SDCG / Forest SG
Multi-mission user interaction and data strategy, facilitate data uptake

WGCV: LPV
Biomass Product Calibration, Cross-calibration, Validation Protocol

Space Agencies

Biomass related Missions



esa	NASA	JAXA	CONAE	DLR	UK SPACE AGENCY
BIOMASS	*GEDI*	*MOLI*	*SAOCOM-1*	*TanDEM-X* (*Δ-DEM*)	*NovaSAR* (Case study)
Sentinel L-Band (Copernicus Extension - TBD)	*NISAR* with ISRO	*ALOS-2*	*SAOCOM-2*	*TanDEM-L* (Phase-A study)	
	ICESat-2	*ALOS-4*			

Outlook

- Enter ”Golden Age” of dedicated missions for biomass estimation
- Large variety of sensors and measurement principles:
  - Waveform and photon counting LiDAR
  - SAR systems (P-, L-, C- and S-band)
- Increased knowledge on terrestrial global carbon stock and dynamics
- In-situ data, validation and accuracy assessment need global cooperation and coordinated effort