

CCI+ Info Day

- Biomass

Frank Martin Seifert, ESRIN, 6 July 2017





Biomass and Climate

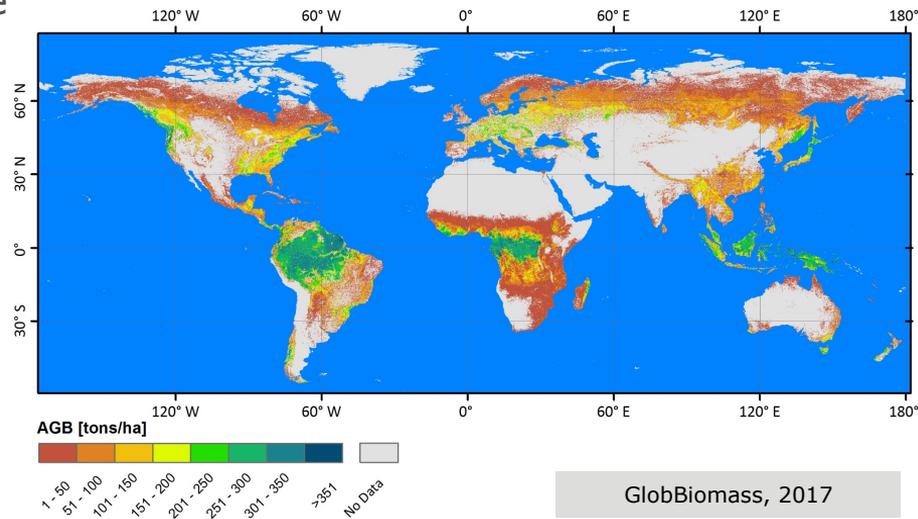


Global monitoring of vegetation biomass and its dynamics is essential for understanding carbon sequestration and emission, to accurately model the response of vegetation to climate warming, and to support mitigation strategies.

Biomass plays two major roles in the climate system [GCOS-154]:

- photosynthesis withdraws CO_2 from the atmosphere and stores it as biomass, which then provides a source of soil carbon through plant detritus and mortality, with associated respiration.
- the amount of CO_2 , CH_4 , CO , and aerosols emitted by fire depends on the biomass consumed.

ECV Biomass will address Above-Ground Biomass in forested areas.





GCOS Requirements

ECV	Res.	Freq.	Uncertainty	Stability (10yr)
Above-Ground Biomass (dry weight of woody matter (t/ha))	500m to 1km (based on 100 - 200m observations)	Annual	<20% (for biomass values >50 t/ha) 10 t/ha otherwise	10%

GCOS Actions (Implementation Plan GCOS-200)

- Action T52: Collaboration on above ground biomass
- Action T53: Above-ground biomass validation strategies
- Action T54: Above-ground biomass validation sites
- Action T55: Above-ground biomass data access
- Action T56: Above-ground biomass: forest inventories



Key Users of the Biomass ECV



European and international climate research organisations that:

- Perform Earth system modelling and the development and implementation of coupled land-atmosphere models;
- Investigate biomass distribution and biomass burning as input to global and regional climate models;
- Research Carbon Feedbacks in the Climate System (WCRP Grand Challenge);
- Develop data assimilation for climate reanalyses (*e.g.* ERA5);
- Perform climate model inter-comparison and validation studies (*e.g.* CMIP6);
- Contribute research on the climate system to the IPCC scientific assessments.

International REDD+ community:

- Provide national estimates for REDD+ reporting and its plausibility checks;
- Develop or provide REDD+ related biomass information services;



UNFCCC GCOS and IPCC:

GCOS provides vital support for research and systematic observations to characterize the state of the global climate system and its variability, whereas IPCC is the international body for assessing the science related to climate change.

UNFCCC REDD+

Biomass estimates broken down on country level can support national reporting or provide plausibility checks for national reporting;

GOFC-GOLD:

Global Observation of Forest and Land Cover Dynamics is a coordinated international effort working to provide ongoing space-based and in-situ observations of forests and other vegetation cover, for the sustainable management of terrestrial resources and to obtain an accurate, reliable, quantitative understanding of the terrestrial carbon budget → WG Biomass.



Biomass: Satellite Instruments



Current continental- to global-scale maps of biomass are mainly based on data from sensors that are now defunct.

SAR: ALOS-2, Sentinel-1, TerraSAR/TanDEM-X, COSMO-SkyMed, SAOCOM, NOVOSAR, NISAR, BIOMASS Earth Explorer, ALOS-1, ERS-1/-2, Envisat ASAR, JERS, ...

Optical: Sentinel-2, Landsat-8, ...

Imaging Spectrometers: MODIS, OLCI, MERIS,

LIDAR: GLAS, ATLAS, GEDI, ...

Systems: current – future – past



Biomass: Key Issues for CCI+



CCI Biomass will produce consistent global biomass time series starting with an actual global mapping based on:

- International assessment of forest biomass retrieval algorithms, and improved algorithms exploiting existing and upcoming satellite instruments;
- Characterisation of above ground biomass in forested areas of different biomes (boreal / temperate, wet tropical and dry tropical forest) for a global estimate;
- Linkage to existing key in-situ networks and consolidation of related observations including inventory data, ground-based lidar, allometry, wood density ...;
- Provision of global estimates for forest ecology, deforestation and forest degradation (REDD+) and forest regrowth as secondary objective;
- Production of consistent long-term time series (2017/18, 2007-10, ...);
- More comprehensive validation of biomass maps and increase consistency between estimates derived with different methods and in different epochs;
- Characterization of uncertainty and long-term stability of ECV products;