



CCI
BIOMASS

CLIMATE RESEARCH DATA PACKAGE

YEAR 1

VERSION 1.0

| | |
|------------------|---------------------|
| DOCUMENT REF: | CCI_BIOMASS_CRDP_V1 |
| DELIVERABLE REF: | D4.2-CRDP |
| VERSION: | 1.0 |
| CREATION DATE: | 2019-07-08 |
| LAST MODIFIED | 2019-08-15 |

| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 2 | 08.07.2019 | |

Document Authorship

| | NAME | FUNCTION | ORGANISATION | SIGNATURE | DATE |
|----------|------------|-----------------|------------------------|-----------|------|
| PREPARED | M. Santoro | | GAMMA | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| PREPARED | | | | | |
| VERIFIED | S. Quegan | Science Leader | Sheffield University | | |
| VERIFIED | R. Lucas | Project Manager | Aberystwyth University | | |
| APPROVED | | | | | |

Document Distribution

| ORGANISATION | NAME | QUANTITY |
|--------------|----------------------|----------|
| ESA | Frank Martin Seifert | 1 |

Document History

| VERSION | DATE | DESCRIPTION | APPROVED |
|---------|------------|---------------------|----------|
| 1.0 | 2019-08-14 | First draft version | |
| 1.1 | 2018-11-15 | | |

Document Change Record (from Year 1 to Year 2)

| VERSION | DATE | DESCRIPTION | APPROVED |
|---------|------|---------------------|----------|
| 1.0 | | First draft version | |
| | | | |



| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 3 | 08.07.2019 | |

Table of Contents

| | |
|--|---|
| Table of Contents | 3 |
| Table of Figures..... | 4 |
| Symbols and Acronyms..... | 5 |
| 1. Introduction..... | 6 |
| 1.1. Purpose of the document..... | 6 |
| 1.2. Document Status of the document | 6 |
| 1.3. Preface | 6 |
| 1.4. Temporal Coverage | 7 |
| 1.5. Spatial Coverage | 7 |
| 1.6. Data availability and release | 7 |
| 1.7. Examples | 7 |





| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 4 | 08.07.2019 | |

Table of Figures



Figure 1: Global AGB estimates for the year 2017. Spatial resolution: 100 m. AGB has been constrained between 0 and 350 Mg/ha to enhance the color contrast.7

Figure 2: Standard error of global AGB estimates for the year 2017. Spatial resolution: 100 m...8

| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 5 | 08.07.2019 | |

Symbols and Acronyms

| | |
|-----------------|--|
| AGB | Above-ground biomass |
| ALOS-2 PALSAR-2 | Advanced Land Observing Satellite -2 Phased-Array L-band type Synthetic Aperture Radar |
| CCI | Climate Change Initiative |
| CRDP | Climate Research Data Package |
| ECV | Essential Climate Variable |
| ESA | European Space Agency |
| FAO | Food and Agriculture Organization |
| GLAS | Geoscience Laser Altimeter |
| GSV | Growing Stock Volume |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| SAR | Synthetic Aperture Radar |
| VCF | Vegetation Continuous Fields |

| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 6 | 08.07.2019 | |

1. Introduction

1.1. Purpose of the document

This document is a cover for the Climate Research Data Package (CRDP) for the Biomass project produced in Phase 1 of ESA's Climate Change Initiative (CCI+, 2018-2021).



1.2. Document Status of the document

This is the first issue of the CRDP document in Phase 1 of the project, reflecting Version 1.0 of the Climate Research Data Package (CRDPv1).

1.3. Preface

Above-ground biomass (AGB) is an Essential Climate Variable (ECV) within the Global Climate Observing System (GCOS). For climate science communities, AGB is a pivotal variable of the Earth System, as it impacts the surface energy budget, the land surface water balance, the atmospheric concentration of greenhouse gases and a range of ecosystem services. The requirement is for AGB to be provided wall-to-wall over the entire globe for all major woody biomes, with a spatial resolution between 500 m and 1 km (based on satellite observations of 100-200 m) spatial resolution, with a relative error of less than 20% where AGB exceeds 50 Mg/ha and a fixed error of 10 Mg/ha where the AGB is below that limit.

One of the objectives of the CCI Biomass project is to generate global maps of AGB using a variety of Earth Observation (EO) datasets and state-of-the-art models for three epochs (2017-2018, 2018-2019 and 2010) and assess biomass changes between years and over 10 years. In the Biomass CCI project, synthetic aperture radar (SAR) observations of the backscatter from ALOS-2 PALSAR-2 and Sentinel-1 are pre-processed to a common spatial grid. Each dataset is then inverted to estimate growing stock volume (GSV, units: m³/ha) with the BIOMASAR algorithm and with aid of auxiliary data layers acting as a constraint to the inversion (forest transmissivity based on ICESat GLAS observations, Land Cover CCI, MODIS Vegetation Continuous Field, Landsat tree canopy density etc.). The ALOS-2 and Sentinel-1 maps of GSV are then merged to generate a final global map of GSV. The accuracy of the map is represented by a layer of per pixel standard error of the GSV. GSV is finally converted to AGB (units: Mg/ha) with global maps of wood density and stem-to-total biomass expansion factors from ESA's GlobBiomass project. AGB represents the density of above-ground biomass stored in live vegetation per unit area for plants with a minimum diameter at breast height of at least 10 cm (definition of the Food and Agriculture Organization, FAO).

| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 7 | 08.07.2019 | |

1.4. Temporal Coverage

CRDPv1 covers the year 2017.

1.5. Spatial Coverage

CRDPv1 covers all land masses between 80°N and -60°S latitude.

The projection is geographic. The vertical and horizontal pixel spacing is 0.000888888°, corresponding to 100 m at the Equator.

1.6. Data availability and release

CRDPv1 will be made available through the CCI Data Portal (<http://cci.esa.int/data>).

Data are provided in the form of a single netcdf file: ESACCI-BIOMASS-L4-AGB-MERGED-100m-2017-fv1.0.nc

AGB and AGB standard errors can be made available on request in the form of geotiff files.

1.7. Examples

Figures 1 and 2 show the CCI BIOMASS dataset of the year 2017 (AGB and AGB standard error) as part of CRDP v1.

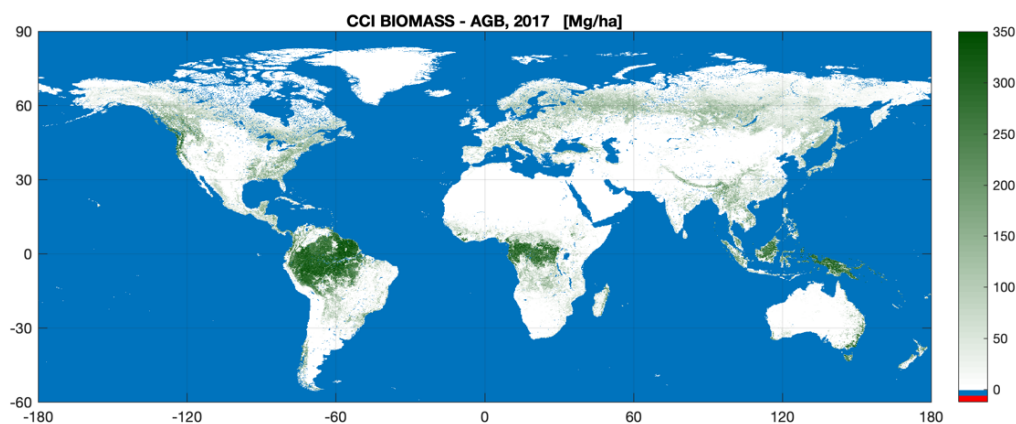




Figure 1: Global AGB estimates for the year 2017. Spatial resolution: 100 m. AGB has been constrained between 0 and 350 Mg/ha to enhance the color contrast.

| | | | | |
|--|-------|--|------------|--|
|  | Ref | CCI Biomass Climate Research Data Package v1 | |  |
| | Issue | Page | Date | |
| | 1.0 | 8 | 08.07.2019 | |

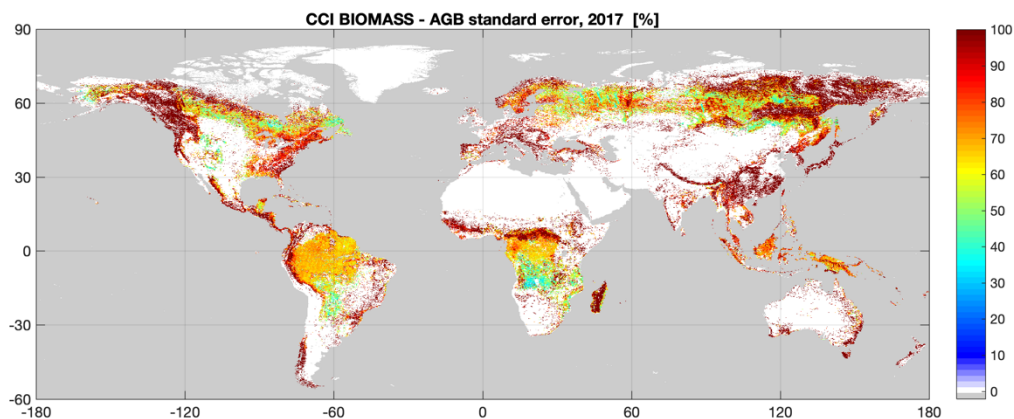


Figure 2: Standard error of global AGB estimates for the year 2017. Spatial resolution: 100 m.