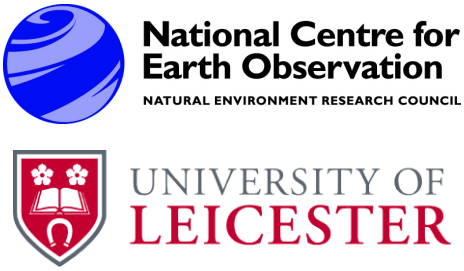
Africa Aboveground Biomass Map 2017



Prepared by

Dr Pedro Rodriguez-Veiga

July 2021

Revision History

Deliverable	ReadMe file appendix to Africa AGB map 2017		
Programme	Carbon Cycle and Official Development Assistance (ODA) programmes		
Authors	Dr. Pedro Rodriguez Veiga (pedro.rodriguez@leicester.ac.uk)		
Distribution			
Reason for change			
Issue			
Revision			
Date			
Release	1		
Version	0		

Contents

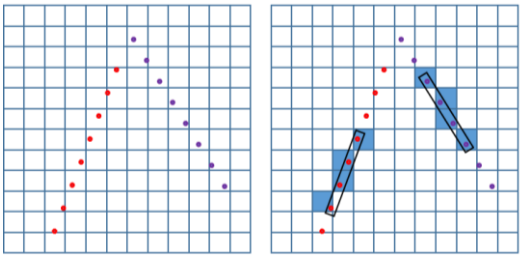
1. Introduction 3
2. Dataset Description 3
3. Data Policy 6

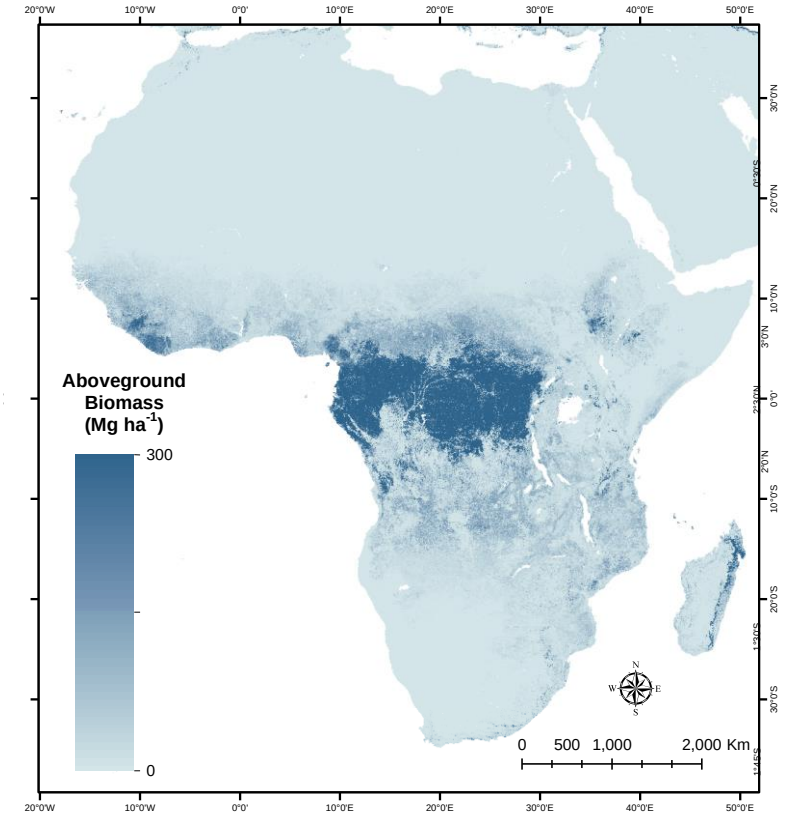
1. Introduction

This ReadMe file is an appendix to the Africa Aboveground Biomass map for the year 2017 developed within the NCEO Carbon Cycle and Official Development Assistance (ODA) programmes. Aboveground woody biomass for Africa in forest areas, vegetated wetlands, and wooded grassland for the year 2017 was mapped.

2. Dataset Description

Africa Aboveground Biomass map 2017 v0	
File name	*NCEO_Africa_AGB_100m_2017_v0.zip*
File description	*The zip file contains 2 raster files:* • *AGB_map_2017v0.tif* • *SD_AGB_map_2017v0.tif*
File size	*Columns & Rows: 78077, 81024* *Size: 2.97 GB*
Cartographic reference system (ellipsoid, map projection, etc)	*GCS_WGS_1984, WKID: 4326 Authority: EPSG* *Angular Unit: Degree (0.0174532925199433)* *Prime Meridian: Greenwich (0.0)* *Datum: D_WGS_1984* *Spheroid: WGS_1984* *Semi-major Axis: 6378137.0* *Semi-minor Axis: 6356752.314245179* *Inverse Flattening: 298.257223563*
Spatial Coverage	*Africa*
Spatial Extent (Upper left corner & Lower right corner)	*UL: 37.7310385636, -18.2735295096* *LR: -35.0540590169, 51.8642329286*
Spatial Resolution	*0.00089831528 degrees (100 m) pixel size*
Pixel Units	Aboveground woody biomass (AGB) as dry matter in t ha^{-1}
Format	*GeoTiff* *Pixel type: unsigned integer* *Pixel Depth: 16 Bit* *NoData value: 65536* *Compression: LZW*
Temporal Coverage	*2017*

Africa Aboveground Biomass map 2017 v0	
Scaling	*N/A*
Training dataset	*GEDI footprints clusters: We grouped GEDI data in clusters of 4 consecutive footprints along track and relate them to 50m resolution pixels:*  *Airborne AGB LiDAR maps from different forest, savannah and mangrove sites in Africa*
Spatial data inputs	*ALOS-2 PALSAR-2 dual polarization annual mosaic 2017, and Landsat Percent Tree Cover*
Additional Inputs	Landsat Percent Tree Cover (PTC) was also used to constrain AGB estimations to pixels with PTC > 0 (discarding desserts, water bodies, etc)
Algorithm	This product estimates aboveground woody biomass in African forests and woodlands at 100m spatial resolution. A Canopy Height Model (CHM) map for Africa was first generated by combining GEDI canopy height measurements (RH_{100}) with L-band SAR (JAXA ALOS-2 PALSAR-2) and Landsat Percent Tree Cover by means of a Random Forests algorithm within a spatial k-fold calibration / validation framework. Then, an empirical model relating CHM to AGB, and developed using several Airborne LiDAR AGB maps, was used to estimate AGB
Uncertainty	The total uncertainty (SD) at pixel level (ε_{AGB}) is composed of different sources of error, which are assumed to be random and independent. These are propagated using the following equation: $\varepsilon_{AGB} = (\varepsilon^2_{CHM} + \varepsilon^2_{LiDAR} + \varepsilon^2_{model})^{1/2}$ where ε_{LiDAR} is the SD from AGB LiDAR maps used as reference and includes field measurements, tree allometries and model errors. The ε_{model} is the error of AGB = f(CHM) empirical model. The ε_{CHM} is the SD from our CHM retrieval based of RF and calculated as follows: $\varepsilon_{CHM} = (\varepsilon^2_{measurement} + \varepsilon^2_{temporal\_difference} + \varepsilon^2_{sampling} + \varepsilon^2_{prediction})^{1/2}$

Africa Aboveground Biomass map 2017 v0	
	where $\varepsilon_{measurement}$ is the SD arising from the measurement error of the GEDI footprint, $\varepsilon_{temporal\_difference}$ is the SD from the use of GEDI footprints and EO imagery acquired at different time periods, and $\varepsilon_{sampling}$ is the SD originating from the variability of CHM within the pixel. The $\varepsilon_{prediction}$ corresponds to our model SD originated from the k-fold framework. The $\varepsilon_{prediction}$ also accounts for errors that arise if the sampling sites are not truly representative of the distribution of CHM in the region.
Image preview	
Contact person	*Dr. Pedro Rodríguez-Veiga, NCEO, University of Leicester, pedro.rodriguez@leicester.ac.uk*
Known Issues	Residual scan line corrector (SLC) effects due to the use of Landsat Percent Tree Cover (derived from Landsat imagery) are visible in some areas of the map. As previously mentioned, Landsat Percent Tree Cover (PTC) was used to constrain AGB estimations to pixels with PTC > 0 (discarding desserts, water bodies, etc)

3. Data Policy

This product (version 0) may be used for educational and/or scientific purposes, on the condition that you (i) credit the publication / the producer of the data (see copyright notice below), and (ii) acknowledge NCEO.

Copyright notices:

- Dataset/Publication reference:

  **A research article about this dataset is currently under preparation. Please contact the author to ask about the correct reference to be used (i.e. pedro.rodriguez@leicester.ac.uk)*

- Copyright:

  Africa AGB 2017 map: ©2021 University of Leicester

- Example of acknowledgement:

  "The Africa aboveground biomass map 2017 was produced by the National Centre for Earth Observation (NCEO), University of Leicester with funding from the NCEO Carbon Cycle and ODA Programmes"