Supporting Information

Table of Contents

1. Supplementary model parameters and methods

Text 1. Weights and bias corrections in weighting technique (WT) model

The weights computed by the WT method are shown in Table S2 for each participating AGB dataset and over regions A, B, C, D and E. As previously noted in Hobeichi et al. (2018), negative weights are possible given that the WT method accounts for error dependencies in the participating AGB datasets. It can be deduced from Table S2 that the Baccini map is the major constituent of the WT-AGB in region A, the Santoro map is the major contributor in region B. The Santoro map contributes to most of the WT-AGB in region C. In regions D and E, the most contributor to the WT-AGB are the Santoro and Su map, respectively. Note that the weights have been applied on the bias corrected datasets rather than being directly applied to the original datasets. Bias in the individual datasets has been computed from its bias with the observed data.

Text 2. Contribution of the participating AGB datasets to random forest (RF) model

Table S3 shows the importance of each dataset in the RF model built in each of the five regions. The importance of each dataset is computed during the building process of the RF model by assessing how much the RMSE with respect to field measurements changes when this dataset is replaced by another dataset across all nodes and trees. The dataset that achieves a lower RMSE more frequently than the others is considered the most important dataset. The Baccini and Su maps are found the most important predictors of the RF model in regions A and C respectively, while the Huang map scores the highest important rank in regions B, C and D.

2. Supplementary Figures

Figure S1: Example of visual selection of the field plots using Google Earth images. (a) location: 24.9 °N, 112.7 °E; σ_{TC} = 10.8%, (b) location: 31.7 °N, 109.6 °E; σ_{TC} = 13.2%, (c) location: 25.2 °N, 113.5 °E; σ_{TC} = 32.2%, and (d) location: 33.4 °N, 108.3 °E; σ_{TC} = 28.5%. (a-b) the field plots satisfied our criteria (i.e., the forest cover of the pixel was larger than 60%, with σ_{TC} < 15%), (c-d) the field plots did not satisfied our criteria (i.e., the forest cover of the pixel was less than 60%, with σ_{TC} > 15%). The red polygon represents the 1 km pixel of the corresponding AGB maps and the red rectangle represents the field plots.

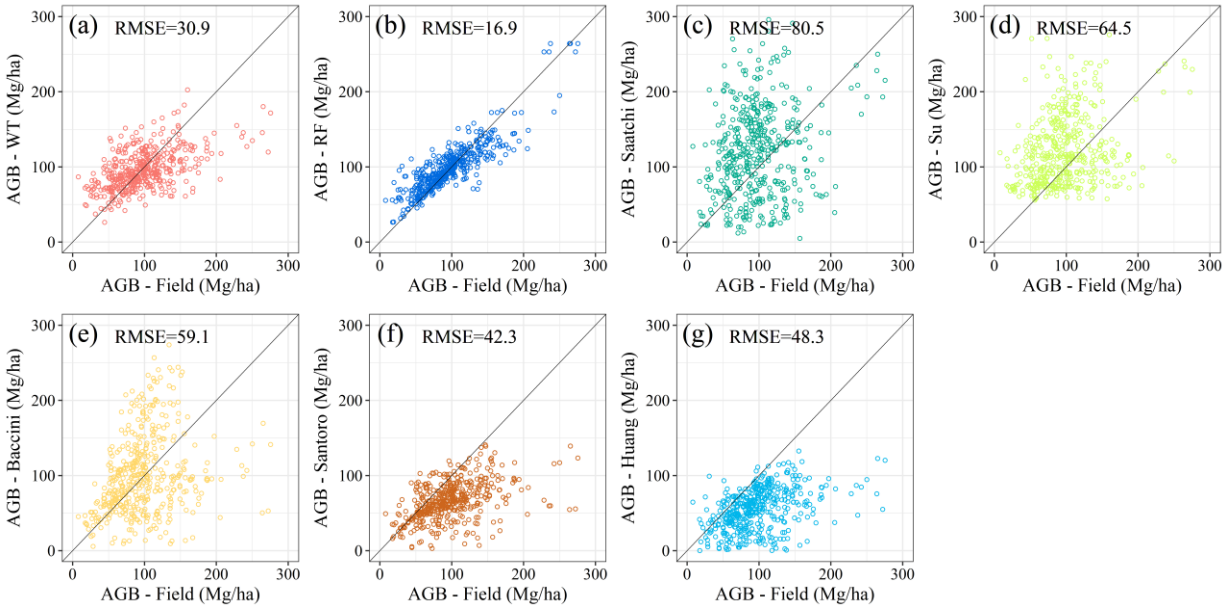

Figure S2: Scatterplots of all the available field AGB (x-axis) and estimated AGB (y-axis) of (a) WT approach, (b) RF approach, (c) Saatchi, (d) Su, (e) Baccini, (f) Santoro, and (g) Huang map. RMSE are given in Mg/ha. Note that this is a much larger collection of field measurements than those shown in Figure 4.

3. Supplementary Tables

Table S1: Overview of the datasets used in this study.

Data source	Forest area (10^6 ha)	Density (Mg/ha)	Period	Resolution	Reference
Field plots	188.20	89.20	2011-2015	--	Tang et al., 2018
Saatchi map	170.00	115.42	2015	1 km	Saatchi et al., 2011
Baccini map	170.00	100.23	2000	30 m	Baccini et al., 2012
Santoro map	182.98	61.24	2010	100 m	Santoro et al., 2020
Su map	170.00	120.00	2004	1 km	Su et al., 2016
Huang map	164.90	69.88	2006	30 m	Huang et al., 2019
Land cover	170.00	--	2010	1 km	Liu et al., 2014

Table S2: Weights assigned to the participating AGB products and bias correction in Mg/ha (in brackets) computed at each region.

Region	Saatchi	Su	Baccini	Santoro	Huang
A	-0.17 (-6.5)	0.57 (-7.7)	0.51 (-30.17)	0.37 (-31.6)	-0.28 (-46.4)
B	-0.27 (-10.6)	0.18 (38.6)	0.32 (-58.23)	0.89 (-69.4)	-0.12 (-89.8)
C	0.02 (47.3)	0.54 (51)	-0.42 (5.4)	0.71 (-23.9)	0.15 (-18.2)
D	0.02 (52.6)	0.05 (50.9)	-0.05 (54.5)	0.77 (-21.3)	0.21 (-28.26)
E	0.01 (62.9)	0.5 (98.8)	0.19 (-33.6)	0.05 (-51.9)	0.25 (70.1)

Table S3: Importance of the five participating AGB products in the RF model in each region.

Importance rank	A	B, C and D	E
1	Baccini	Huang	Su
2	Santoro	Baccini	Saatchi
3	Su	Santoro	
4	Huang	Su	
5	Saatchi	Saatchi	

Table S4: Results of the out-of-sample test, showing the RMSE, bias (in brackets), and relative standard deviation difference (RSD), all computed against the observational data. The RMSE and bias are given in Mg/ha.

Region	WT	RF	Saatchi	Su	Baccini	Santoro	Huang
A	37.0 (-6.1)	35.3 (-7.3)	58.6 (-19.8)	39.7 (-16.3)	54.2 (-37.6)	55.2 (-38.8)	66.8 (-54.8)
	-18.4%	**-18.2%**	**3.2%**	**-21.8%**	**-13.1%**	**-14.6%**	**-17.0%**
B	7.8 (4.8)	18.0 (12.8)	99.3 (90.8)	92.0 (88.3)	49.5 (35.5)	17.2 (-16.8)	21.2 (-16.4)
	-5.2%	**2.7%**	**35.3%**	**31.2%**	**23.3%**	**1.5%**	**-2.0%**
C	12.8 (-4.4)	10.0 (-6.2)	63.9 (58.7)	58.6 (55.0)	24.5 (18.1)	33.9 (-29.4)	34.3 (-30.1)
	6.0%	**0.1%**	**15.2%**	**1.5%**	**12.2%**	**2.0%**	**4.5%**
D	15.2 (-1.8)	13.6 (-0.9)	82.3 (66.6)	61.0 (53.1)	66.2 (56.5)	35.0 (-28.7)	36.3 (-32.4)
	-6.7%	**-7.0%**	**25.2%**	**8.1%**	**22.6%**	**-9.5%**	**-4.5%**
E	75.7 (-27.8)	33.71 (-13.4)	40.3 (-3.6)	54.6 (16.8)	102.3 (-55.0)	100.3 (-68.8)	102.7 (-64.8)
	-33.2%	**-18.6%**	**-17.2%**	**-22.9%**	**-36.5%**	**-41.0%**	**-24.6%**

Table S5: Results of the out-of-sample test, showing the relative RMSE and relative bias (in brackets). The relative RMSE and relative bias are given in %.

Region	WT	RF	Saatchi	Su	Baccini	Santoro	Huang
A	4.1 (9.2)	3.9 (7.2)	7.5 (-14.3)	4.9 (-10.5)	8.7 (-27.8)	9 (-28.6)	14.3 (-45.2)
B	3.6 (10.5)	7.4 (20.7)	25 (85.6)	24.1 (83.4)	15.9 (51.1)	11.1 (-27.6)	13.6 (-23)
C	3.4 (-7.2)	2.8 (-8.2)	9.1 (79)	8.6 (80.1)	5 (22.4)	13.9 (-39.1)	14.3 (-41.5)
D	1.6 (1.3)	1.4 (2)	4.9 (78.3)	4 (63.8)	4.2 (61.4)	5.1 (-27.8)	5.6 (-34.7)
E	14.2 (-5.8)	5.8 (-4.3)	6.5 (3.4)	7.9 (17.4)	24.2 (-17.9)	32.4 (-41.2)	30.6 (-44.6)