



Interactive comment on “The global forest above-ground biomass pool for 2010 estimated from high-resolution satellite observations” by Maurizio Santoro et al.

Anonymous Referee #2

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1. GENERAL COMMENTS

The manuscript addresses a topic of immense importance for climate change research and national reporting to international environmental agreements, providing improved geospatially explicit estimates of the global carbon pool of forest ecosystems.

It describes the development of global above ground biomass and growing stock volume maps at 1 ha spatial resolution from, primarily, satellite-borne radar data, and includes a thorough accuracy assessment. A comparison with other global AGB maps is provided, as well as with country reports from the FAO Forest Resources Assess-

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ment.

The manuscript is well-written and generally easy to follow, with the authors making great effort to clarify and discuss both strengths and weaknesses of the dataset. Only the sections on the assessment of global forest biomass resources (3.4) and comparison of AGB map estimates (3.5) are long and rather heavy to ingest for the reader. Consolidating these to reduce size somewhat would improve readability.

The dataset is easily accessible for download and the geotiff format accommodates straight-forward use with standard GIS software.

2. SPECIFIC COMMENTS

Line 136: "...PALSAR acquired images in the Fine Beam (FB) mode with 25 m spatial resolution..." should be "...PALSAR acquired images in the Fine Beam Dual-polarisation (FBD) mode with 20 m spatial resolution...". Note: acquisitions were made at 20 m resolution for the FBD data (and 10 m for FBS).

136-138: "Image acquisition followed a predefined observation scenario with the aim of achieving spatially and temporally consistent large-scale observational datasets". Add reference to ALOS PALSAR acquisition strategy: Rosenqvist, A., Shimada, M and Watanabe, M. ALOS PALSAR: A pathfinder mission for global-scale monitoring of the environment. IEEE Transactions on Geoscience and Remote Sensing, Vol. 45, No. 11, pp 3307-3316, Nov. 2007. doi.org/10.1109/TGRS.2007.901027

139: "...yearly mosaics of the radar backscatter...". Mention also that the PALSAR mosaics have been subject to radiometric terrain correction and are provided as gamma-0.

161-172: Please add a sentence to clarify how the time difference between the GLAS data (2003-2009) and the other datasets (approx. 2010) was handled to avoid systematic bias

Section 2.2 (AGB estimation): Throughout section 2.2 (and a bit of 2.3) and in equa-

tions 1, 3, 7 and 8, σ_0 is used to denote the radar backscatter, while the SAR data (or at least the L-band mosaics) are provided as γ_0 . This probably does not matter for the models but a brief statement to acknowledge this would be useful to add.

239: “hyper-temporal”. How many ASAR scenes were typically available for any given location? The word hyper-temporal gives the impression that Sentinel-1 style temporal density was available, which was hardly the case for ASAR (over perhaps Europe). Perhaps “multi-temporal” would be a more appropriate description?

260: “. . .uncompensated topographic effects in the ALOS PALSAR mosaics. . .”. How did you parameterise the uncompensated topographic effects to define the weighting factor?

Could you also add a sentence (here or elsewhere in the text) about the cause of these uncompensated effects? Was it due to a lack or, or insufficient, radiometric slope correction in the PALSAR mosaics?

285: Explain how p_1 and p_2 in Eq. 6 are derived. Do they vary regionally?

395-396: “. . .the dataset were converted. . . from AGB carbon units (MgC ha^{-1}) to AGB (Table S5)”. A bit confusing statement. (Is this perhaps a typo?) Is there a difference between “AGB carbon units” and “AGB”? Table S5 offers no clue what you mean here. Please clarify.

The dataset comparisons in Section 3.1 illustrate the great spatial detail of this dataset compared to earlier mapping efforts and the importance of using high resolution satellite data as basis for the mapping. Impressive.

3.3 (Spatial distribution of AGB) For clarity, suggest to indicate early in the section that the acronyms used (TAr, TeDo, TeM, etc) refer to the FAO global ecological zone nomenclature (it becomes clear further down in Fig 6 but one is left wondering for a while)

3.4 (Assessment of global forest biomass resources). 3.5 (Comparison of AGB map estimates) The sections go into a high level of detail and are rather heavy to ingest for the reader. While I leave it to the discretion of the authors, consolidating these to reduce size somewhat would improve readability.

Figure 7: - The figure does not seem to indicate “Country AGB”, but actually “Country AGB density”, or rather “Country AGB average density”, as you indicate the unit [MG/ha]. - Spent quite some time trying to get my head around the rather complex figure 7. It would be helpful to include some kind of legend which clarifies the different parameters you are using to illustrate not only a comparison between your AGB estimates at those of the FRA report, but also country absolute and relative forest area. Something like: - Size of circle - country forest area in CCI map (same scaling across all continents) - Colour of circle - relative country forest area on continent - Colour ramp - Add units to indicate (blue - smallest area on continent, brown - largest area on continent)

652: “All datasets showed...”. Suggest to remind the reader about which datasets, AGB maps, you are referring to here (as one may have lost track of that after the rather dense section 3.4!)

Figure 10. Very helpful summary of section 3.5

722: “Overall, our maps reproduced...”. Suggest to modify to “Overall, the results indicate that our maps reproduced...”

3. TECHNICAL CORRECTIONS

Line 129: “Phase” should be “Phased”

140: “publically” should be “publicly”

141: “0.00022° ” should be “0.000225° ”

809: “SoloEO” should be “soloEO” ;-)

Table S7. (very informative) “COUNTRY” should be “COUNTRY/TERRITORY” “{malvinas)” should be capitalised: “(Malvinas)” “Guinea0Bissau” Typo. Should be “Guinea Bissau” Taiwan is missing Suggest to report separately as “Republic of China (Taiwan)” and “People’s Republic of China”, resp. “The former Yugoslav Republic of Macedonia” new official name “North Macedonia”

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