

Interactive comment on “The full greenhouse gases budget of Africa: synthesis, uncertainties and vulnerabilities” by R. Valentini et al.

Anonymous Referee #1

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General comments:

This is a long and interesting paper reviewing the full greenhouse gases budget of Africa, including a synthesis, uncertainty and vulnerabilities. The paper “aims at providing an improved estimate of the carbon balance of continental Africa, along with balances for non-CO₂ greenhouse gases, through the integration of data from different sources and methodologies with the related quantification of the uncertainties”.

In general is the paper well formulated and address relevant scientific questions, well within the scope of BG. Even if the paper does not use much novel concepts, ideas, tools, or data is it a comprehensive collection of data for a region where such collections are rare. Some of the data/concepts may be new to Africa and a continental African synthesis is welcome.

A paper such as this contains large amounts of data and information and will probably be a very useful collection to cite for other authors dealing with similar topics. Hence it would be good if tables and figures were more self-supported, i.e. the reader should be able to understand the main “message” of each Table/figure without consulting the bulk text. Hence would addition of references in the tables citing other papers be useful.

It would be very useful if additional quality information could be included when various types of up-scaling procedures are used (i.e. when applying empirical relationships from case studies). Add data on the strength of the relationship (r , R^2 , RMSE, etc), number of observations etc. used when applying these empirical relationships for a continental Africa.

Also make sure that when comparing data valid for different time periods, this is clearly stated.

General figure comment: In this paper we have 38 maps of Africa, sometimes in panels where 10 of them are squeezed together. Printed on normal size paper, these are not possible to read. On screen they can be read. We also have slightly different shapes (projections ?) of Africa that makes comparison harder. Standardize this if possible. If the final publication contains full resolution larger illustrations, the interpretation of these would be simpler for the reader.

It would be nice to see more African authors in the author list, assuming that initiative like this is a good way for knowledge transfer.

The description of experiments and calculations is not sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results). This can be improved.

In short is this a valid and important contribution and I support publication given that suggested changes are performed.

Specific comments:

Title: Consider “A full greenhouse. . .” instead of “The full greenhouse. . .”

Provide full references for sources mentioned in footnote 2 (Data were processed from the latest. . .) so the reader can find the same information (website?) as used by the authors.

Table 1: Make sure that references entries such as “Per capita values are estimated on the base of UN World population prospect, the 2010 revision” are matched with identical entries in the reference list (Current corresponding entry = United Nations, Department of Economic and Social Affairs: Population Division, World Population prospect: The 2010 Revision, CD-ROM Edition, 2011). Correcting discrepancies such as this facilitates for the reader and increase paper clarity.

Section 3.1-3.2: It is somewhat unclear if spatial/GIS data used was in equal area projection while areal estimates and the integration of GlobCover and the WHRC was conducted. This may affect the outcome presented.

Define the regions used in Table 1 and indicate them on a map.

P8349:L25-26: Add proper references or URL where these data can be found or are described.

P8350:L1-2: “The aggregated accuracy is 66%”. This is vague and unclear. Is this a combined value for all three or. . .? Clarify and specify. Perhaps refs to existing evaluations (such as http://due.esrin.esa.int/globcover/LandCover2009/GLOBCOVER2009_Validation_Report_2.2.pdf) of these data sets can be included.

P8352:L20: “. . .map has known issues”. This is very vague. Please clarify these known issues.

P8352:L21: “. . .WHRC biomass map has been built with limited ground truth”. Vague. What is limited ground truth and how much if this originate from Africa (i.e. the area of interest in this paper)? Please clarify and give a measure on the correspondence of

the WHRC biomass estimates versus independent ground truth for Africa.

P8352:L26-28. How was the combined error of 19-27% reached? Clarify and describe.

P8356:L24: “they include insufficient data representation from Africa”. Specify how much flux data from Africa that was used (number of site-years or equivalent) in the study. Include the same for the ANN (Papale and Valentini, 2003) approach described later on as well.

Section 3.5: Is there any DGVM estimates actually evaluated with filed data (flux, NPP collections, other types of in situ data etc.)? If so include these, if not state that no such evaluations are available. Inversion data is slightly different and perhaps less understandable for the general reader. Anyhow include a short statement on DVGM model performance for Africa as based on evaluations using quantitative data. Perhaps the NPP sites in FLUXNET or the AfriTRON forest plot network could be used?

Section 3.9: Please add some data on the strength of the relationship, number of observations etc. used when applying empirical relationships (P8370:L18-19)

Technical corrections:

Table 3: Mismatch in column headings?

Table 8: (Thompson et al., 2013) missing in ref list.

Fig 2. Use (P)g as unit for consistence instead of GtC. Legend hard to read, increase font size.

Fig 3a. Make the 2 maps in identical size.

Fig 4&5: Unit should be g C instead of kg C?

Fig 4. Add ref so the reader don't need to consult the bulk text to understand where these simulation originate.

Fig 8. The maps and the legend in this figure can't be read properly. P8371:L14 and

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Table 8: Castaldi et al., 2013 is missing in the reference list. References: First entry = “UN, Population Division of the Department. . .”, should come later on.

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