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

R. Valentini et al.

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We have replied into two separate files to the comments of both referees. Here you can find attached the following files, updated in order to respond to the referees’ requests:
- the updated manuscript
- the updated tables
- the updated Figures 2, 3 and 5

Interactive comment on Biogeosciences Discuss., 10, 8343, 2013.
Natural CO₂ fluxes: yearly means

Fig. 1.

Jena_s99_v3.3  Jena_s96_v3.3
LSCE_var_v1.0  LSCE_an_v2.1
CarbonTracker_CTE2008
Natural CO₂ fluxes (2001-2004 mean)

Mean across all inversions

Standard deviation across all inversions

Fig. 2.
Fig. 3.
Table 1. GHGs emission sources for five different African Regions.

<table>
<thead>
<tr>
<th>Region</th>
<th>Anthropogenic fossil fuel emissions</th>
<th>Per capita emissions (\text{PgCO}_2\text{-eq})</th>
<th>Agriculture</th>
<th>LUCF</th>
<th>Total Emissions</th>
<th>Removals</th>
<th>Net Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORTH AFRICA</td>
<td>0.34 (\text{PgCO}_2\text{-eq})</td>
<td>2.1</td>
<td>0.13 (\text{PgCO}_2\text{-eq})</td>
<td>0.87</td>
<td>0.15 (\text{PgCO}_2\text{-eq})</td>
<td>0.03 (\text{PgCO}_2\text{-eq})</td>
<td>0.02 (\text{PgCO}_2\text{-eq})</td>
</tr>
<tr>
<td>EASTERN AFRICA</td>
<td>0.15 (\text{PgCO}_2\text{-eq})</td>
<td>0.8</td>
<td>0.27 (\text{PgCO}_2\text{-eq})</td>
<td>0.20</td>
<td>0.04 (\text{PgCO}_2\text{-eq})</td>
<td>0.02 (\text{PgCO}_2\text{-eq})</td>
<td>0.02 (\text{PgCO}_2\text{-eq})</td>
</tr>
<tr>
<td>WESTERN AFRICA</td>
<td>0.28 (\text{PgCO}_2\text{-eq})</td>
<td>1.3</td>
<td>0.30 (\text{PgCO}_2\text{-eq})</td>
<td>0.06</td>
<td>0.30 (\text{PgCO}_2\text{-eq})</td>
<td>0.51 (\text{PgCO}_2\text{-eq})</td>
<td>0.45 (\text{PgCO}_2\text{-eq})</td>
</tr>
<tr>
<td>CENTRAL AFRICA</td>
<td>0.07 (\text{PgCO}_2\text{-eq})</td>
<td>0.5</td>
<td>0.56 (\text{PgCO}_2\text{-eq})</td>
<td>0.49</td>
<td>0.55 (\text{PgCO}_2\text{-eq})</td>
<td>1.18 (\text{PgCO}_2\text{-eq})</td>
<td>0.52 (\text{PgCO}_2\text{-eq})</td>
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<tr>
<td>SOUTHERN AFRICA</td>
<td>0.47 (\text{PgCO}_2\text{-eq})</td>
<td>3.1</td>
<td>0.04 (\text{PgCO}_2\text{-eq})</td>
<td>0.01</td>
<td>0.00 (\text{PgCO}_2\text{-eq})</td>
<td>0.00 (\text{PgCO}_2\text{-eq})</td>
<td>0.00 (\text{PgCO}_2\text{-eq})</td>
</tr>
<tr>
<td>Total</td>
<td>1.29 (\text{PgCO}_2\text{-eq})</td>
<td>8.2</td>
<td>8.54 (\text{PgCO}_2\text{-eq})</td>
<td>8.54</td>
<td>3.19 (\text{PgCO}_2\text{-eq})</td>
<td>2.23 (\text{PgCO}_2\text{-eq})</td>
<td>0.95 (\text{PgCO}_2\text{-eq})</td>
</tr>
<tr>
<td>Total by Bombelli et al.</td>
<td>0.938</td>
<td>8.465</td>
<td>4.453</td>
<td>2.968</td>
<td>2.365</td>
<td>0.359</td>
<td></td>
</tr>
</tbody>
</table>

a According to the United Nations geographical sub-regions for Africa, from the United Nations Statistics Division, applications of the methodology for developing the data.

b Per capita values are estimated on the basis of UN World population prospects, the 2010 revision [2011].
The full greenhouse gases budget of Africa: synthesis, uncertainties and vulnerabilities


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Abstract

This paper, developed under the framework of the RECCAP initiative, aims at providing improved estimates of the carbon and GHG (CO$_2$, CH$_4$ and N$_2$O) balance of continental Africa. The various components and processes of the African carbon and GHG budget are considered, existing data are reviewed and new and unpublished data are presented from different methodologies (inventories, ecosystem flux measurements, models, and atmospheric inversion). The results and uncertainties are quantified and current gaps and weaknesses in knowledge and in the monitoring systems are identified. In order to respond to those requirements, the data and models need to be improved and gaps need to be filled. The results are summarized in the following way: (i) Africa is a small sink of carbon on an annual scale, with an average value of ~0.6 ± 0.5 Pg C yr$^{-1}$. Nevertheless the emissions of CH$_4$ and N$_2$O may turn Africa into a net source of radiative forcing (in terms of CO$_2$ equivalent terms. At sub-regional level there is significant spatial variability in both sources and sinks. South Africa is the main source region and central Africa, with its evergreen tropical forests, is the main sink. Emissions...