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Comment

# ***Interactive comment on “Improved model of isoprene emissions in Africa using OMI satellite observations of formaldehyde: implications for oxidants and particulate matter” by E. A. Marais et al.***

## **Anonymous Referee #2**

Received and published: 10 April 2014

Marais et al. present an analysis of new isoprene emissions over Africa derived from OMI formaldehyde observations in comparison with the MEGAN inventory. They explore the factors (temperature, leaf area index) which control the seasonal and spatial variability of the African emissions. They show that emission factors tend to be overestimated in MEGAN inventory especially over equatorial forests. The results are validated using direct leaf measurements from field campaigns taken from literature and using isoprene measured during the AMMA aircraft campaign. The total emission of isoprene in Africa is then estimated and the impact on surface ozone and particular matter quan-

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tified. The paper is well written in a concise and clear manner. This work is suitable for ACP publication and I recommend it after the following comments are addressed.

#### General comment on the evaluation with canopy flux measurements

The OMI-derived and MEGAN isoprene emissions are compared to flux measurements reported in literature and corresponding to years outside the 2005-2009 period analyzed with OMI. Is the interannual variability of isoprene emissions sufficiently small compared to the errors to make this comparison valid? The authors should discuss this point. On the other hand, most of the flux measurements have a small footprint (600m). Is the representativity of these measurements sufficient to be compared the emission derived from OMI (1°x1° gridsquare average). The authors should address this point in more details in their discussion. Moreover, p 6958, lines 22-23, I do not understand the given argumentation for the observed discrepancies at site 2. I would expect that the fact that both flux measurements and OMI have similar footprint would improve the representativity of in situ measurement compared to satellite observation and then improved the comparison.

#### Specific comments

- 1) Page 6954, line 10: The reference Marais et al. 2012 should be added here
- 2) Page 6957, lines 14-16: If I well understood, the errors detailed in the lines above are related to individual observations. The authors should precise and discuss the errors on the 1°x1° gridsquare observations as well.
- 3) Page 6964, lines 5-8: In order to evaluate the effect of isoprene emissions on surface concentrations of ozone and particulate matter, the authors compared GEOS-Chem simulations with and without the isoprene emission. I wonder if considering no isoprene emissions does not introduce a non-linearity in the chemistry and makes the simulations with and without isoprene emissions not really comparable by the end. Is the impact of isoprene emissions linear from 0 to the 77TgCa-1?

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4) Figure 1: I would suggest the authors to add a table with all the references cited in the caption reported with the measurements conditions summarized.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 6951, 2014.

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