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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Isoprene emissions over Asia 1979–2012: impact of climate and land use changes" *by* T. Stavrakou et al.

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We would like to thank the reviewer for his/her positive evaluation of the manuscript and for the useful comments and suggestions. Below we address the raised concerns. The reviewer's comments are *italicized*.

The paper shows the impact of the weaker emissions from a rain tropical forest, expanding oil palm with the higher emissions, and more realistic downward solar radiation, on estimations of isoprene emissions in Asia. The estimated bottom-up emissions were also verified by satellite-based emissions. The methods seem sound and the most up-to-date. The results are very useful for the related researchers. The paper is well-organized and the interpretation seems so clear that a reader can easily

understand the contents. In the text, the reviewer could almost find the reasons for some questions, which he/she would like to ask about the methods and the estimations/results. But he/she still has one question: Why are isoprene emissions larger in S2 than in S3 in Malaysia (Fig. 9)? The results are different from those in Indonesia, although the reasons are found in Page 29564, L28-Page29565, 29565. This means original standard emission factor and/or fraction of oil palm are in S2 more than that in S3?

Emissions from oil palms in Indonesia were not considered in the MEGAN distribution of emission factors, and therefore, accounting for these emissions in S3 leads to a net emission increase in Indonesia. In Malaysia, however, MEGAN already accounted for the presence of oil palm. This is now clarified in Section 2.2 “Description of the simulations" with the following text:

“Note that, over Malaysia, the S0 simulation already accounts for the presence of oil palm, as reflected by increased basal emission rates (3-4 mg m^{-2} h^{-1}) for the cropland PFT over this country. In S3, the basal emission rate of croplands (excluding oil palm) over Malaysia was set to 0.8 mg $m^{-2}h^{-1}$, comparable to values found over Indonesia in MEGAN. "

The emissions are slightly lower in S3 than in S2, because the very high emission rates in the new oil palm PFT are more than compensated by the lower emission rate in the “other cropland" PFT. This is now mentioned in the fourth paragraph of Section 4 “Isoprene fluxes across S0-S4 simulations".

Minor comments:

- *Page 29555, Lines 17-20: There is a similar report of weaker isoprene emission from a rain tropical forest canopy in the Malay Peninsula: Saito, T., Yokouchi, Y., Yoshiko Kosugi, Y., Tani, M., Philip, E., Okuda, T.: Methyl chloride and isoprene emissions from tropical rain forest in Southeast Asia, Geophys. Res. Lett., 35,*

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L19812, doi: 10.1029/2008GL035241, 2008. This also supports your results.

We thank the reviewer for bringing this reference to our attention. The paper is cited and briefly discussed.

- *Page 29563, Lines 8-21: The content (i.e., the relationship between Isoprene emission in Asia and ONI) seems a little bit abrupt, and it should also be stated in the introduction's last paragraph, in advance.*

  We have now added a sentence in the end of the first paragraph of the abstract. "The isoprene flux anomaly over the whole domain and studied period is found to be strongly correlated with the Oceanic Niño Index ($r = 0.73$), with positive (negative) anomalies related to El Niño (La Niña) years."

- *Page 29566, Line 6-8, "negative trend": Here, it is better to state that the negative trend is due to replacement of cropland with tree plantations, as mentioned in page 29554, lines 14-16.*

  The sentence now reads : "This trend is strongly reinforced when adopting the land use changes of S1 scenario (0.7%/yr), due to the replacement of cropland with tree plantations in China between 1979 and 2005 (Fig. 1).

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 29551, 2013.