

***Interactive comment on* “The influence of biogenic emissions from Africa on tropical tropospheric ozone during 2006: a global modeling study” by J. E. Williams et al.**

Anonymous Referee #1

Received and published: 25 June 2009

Review of paper ‘The influence of biogenic emissions from Africa on tropical tropospheric ozone during 2006: a global modeling study’ by Williams J.E. et al.

Overview:

This manuscript presents a comprehensive analysis of the impact of different biogenic emission inventories on atmospheric chemistry processes, and especially on tropospheric ozone. A detailed comparison with measurements is also performed. Considering the huge importance of the terrestrial biosphere in atmospheric chemistry, as a significant source of reactive compounds (nitrogen oxides and volatile organic compounds especially), this work addresses a key question and help to better quantify the

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uncertainty associated with the use of various emission inventories. I therefore strongly recommend this manuscript for publication in Atmospheric Chemistry and Physics. In order to improve some points in the manuscript, I would like the following comments to be considered beforehand.

General comments:

On top of precipitations regime, fertilizers have also been demonstrated to impact significantly nitrogen oxide emissions from soils, and can lead to strong increase in emissions (see Yienger and Levy, 1995, Jambert et al., 1997, Ganzeveld et al., 2002. . .). And yet, no mention is made about this impact in the paper. Could the authors add a few words about this? Would this impact be important for the African regions of interest in this particular study?

In section 2, page 10373 and 10374, in the description of emission inventories and run conditions:

-The authors mention the injection height for emissions from all sectors except transport. What about the injection height for transport and biomass burning emissions then, is it similar? Please give at least an order of magnitude for the different heights.

-Apart from the use of the ORCHIDEE model to provide vegetation description, and the period of interest, the differences, or similarities, between the POET and the Lathière et al. (2006) inventories are not detailed. Could the author add a few words on this topic? Are these inventories based on the parameterisations for biogenic VOCs, do they both take into account the same impacts for NO emission from soils (pulse, biomass burning, fertilizers. . .).

In section 3, page 10376, line 2-7: Pay attention that the change in deforestation over the 1983-1995 period is not actually considered in the Lathière et al. (2006) inventory. Indeed, the same vegetation distribution, including crop distribution, is considered for the whole period, and the only variation in vegetation growth (LAI) is related to changes

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in climate and atmospheric CO₂. Moreover, to my knowledge, crop distribution was considered as well in the work by Guenther et al. (1995).

Specific comments:

Abstract, page 10368, line 4: replace 'tropopause' by 'troposphere'

Abstract, page 10368, line 7: replace 'isoprene, biogenic NO and biogenic volatile organic compounds' by 'biogenic emissions of isoprene, other volatile organic compounds and NO'

Abstract, and in the whole paper: replace 'Lathi re' by 'Lath re'

Abstract, page 10368, line 8 and 24, and in the whole paper: The use of the term 'climatological' or 'climatology' is a bit confusing when related to emission inventories. Please replace by '12-year average' or something similar.

Section 1, page 10369, line 6 and in the whole paper: replace 'BVOC's' by 'BVOCs', removing apostrophe.

Section 1, page 10369, line 4: replace 'isoprene is the most dominant biogenic emission' by 'isoprene is the most dominant biogenic species'

Section 1, page 10369, line 9: replace 'in remote regions necessitates' by 'in remote regions requires'

Section 1, page 10370, line 16: replace 'HCHO' by 'formaldehyde (HCHO)'. Similarly, for a better understanding of non formula-experts, please mention the full name of chemical species every first time the formulas are mentioned (especially in the list given page 10373 and 10374).

Section 1, page 10371, line 1: in the sentence 'for the C₂ compounds', give a few examples of C₂ compounds of interest.

Section 1, page 10371, line 5:

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-replace 'biogeochemical models that utilize vegetation data' by 'biogeochemical models that include a dynamic description of vegetation distribution and growth'

-replace 'Such models account for the correct distribution. . . and differences in vegetation type' by 'Such models account for an interactive calculation of vegetation distribution, . . . and differences in vegetation type, depending on climate conditions'.

Section 1, page 10371, line 18: replace 'This resulted in increases in tropospheric O₃' by 'This resulted in an increase in tropospheric O₃'

Section 1, page 10371, line 29: replace 'from the ORCHIDEE model' by 'from the vegetation model ORCHIDEE'

Section 2, page 10372, line 12: states what the meaning of ' γ N₂O₅' is.

Section 2, page 10373, line 20: please specify that the latitudinal gradient is applied to methane concentrations, if this is indeed the case.

Section 4, page 10376, line 18: replace 'However, for brevity we exclude' by 'However, for brevity, we exclude', adding comma.

Section 4, page 10376, line 21: replace 'maybe' by 'may be'

Section 4, page 10376, line 23: replace 'photolytic destruction or oxidation these species' by 'photolytic destruction or oxidation, these species', adding comma

Section 4, page 10380, line 21: replace 'upto' by 'up to'

Section 5, page 10384, line 17: replace 'can be transported significant distances' by 'can be transported over significant distances'

Section 5, page 10384, line 24: replace 'the CO which is released biomass burning activity from Africa' by 'the CO which is released from biomass burning activity in Africa'

Section 5, page 10385, line 18: replace 'which increases in the amount' by 'which increases the amount'

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Section 6, page 10388, line 21: replace 'maybe' by 'may be'

Section 7, page 10396, line 22: replace 'metrological' by 'meteorological'

Tables and Figures:

Table 2: Many information are given in this table which makes it a bit hard to read. To clarify, could the authors add some legend between the 'trace species' column and the 'Sahara' column, to precise which emission each line is related to. For example 'A' for anthropogenic activity, then 'BB' for biomass burning, 'B/LATH' for biogenic emissions with Lathière et al. (2006) inventory and B/BASE for biogenic emissions with the POET inventory.

Table 6: replace 'Paranthesis' by 'parenthesis'

Figures 4 to 9: For the righ-column panels, is it actually the difference or the reduction that is illustrated? Indeed, to assess the impact of LATH in percent, the formula should be $(LATH-BASE)/BASE * 100$, and not $(LATH-BASE)/LATH * 100$. Could you please check?

Figure 7: Could you please write the legend in details to make clear what the figures are now illustrating.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 10367, 2009.

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