

Interactive comment on “Quantifying the uncertainty in simulating global tropospheric composition due to the variability in global emission estimates of Biogenic Volatile Organic Compounds” by J. E. Williams et al.

Anonymous Referee #1

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General comments: This manuscript presents an interesting study about the uncertainty in the impacts of biogenic emissions on global tropospheric composition. The authors used different global biogenic emission inventories to examine the associated uncertainties. The topic of this paper is suitable for ACP, but I think that there are some details that need to be addressed before publication is suitable. Language needs to be improved in a numerous places to make sure the description is more precise. Below I list some specific comments:

Specific comments: Page 28767 (Line 7-10): The review of global estimates needs
C11199

to be updated to include new estimates by Guenther et al. (2012) Page 28768: The first a few lines need to be updated to include some recent findings about biogenic emissions (methanol and formic acid) using some satellite products. i.e. Stavrou, T., Guenther, A., Razavi, A., Clarisse, L., Clerbaux, C., Coheur, P.-F., Hurtmans, D., Karagulian, F., De Mazière, M., Vigouroux, C., Amelynck, C., Schoon, N., Laffineur, Q., Heinesch, B., Aubinet, M., Rinsland, C., and MÅüller, J.-F.: First space-based derivation of the global atmospheric methanol emission fluxes, *Atmos. Chem. Phys.*, 11, 4873–4898, doi:10.5194/acp-11-4873-2011, 2011.

Stavrou, T., MÅüller, J.-F., Peeters, J., Razavi, A., Clarisse, L., Clerbaux, C., Coheur, P.-F., Hurtmans, D., De Mazière, M., Vigouroux, C., Deutscher, N. M., Griffith, D. W. T., Jones, N., and Paton-Walsh, C.: Satellite evidence for a large source of formic acid from boreal and tropical forests, *Nat. Geosci.*, 5, 26–30, 2012.

Page 28769 (Line 11-14): the response of isoprene to CO₂ has been included in some biogenic emission model, i.e. Heald et al. (2009). This needs to be clarified if this statement is for vegetation or isoprene. If it is for vegetation, the global dynamic vegetation models used in global climate models do account for CO₂ impacts.

Heald, C. L., Wilkinson, M. J., Monson, R. K., Alo, C. A., Wang, G., and Guenther, A.: Response of isoprene emission to ambient CO₂ changes and implications for global budgets, *Glob. Change Biol.*, 15, 1127–1140, 2009.

Page 28769 (Line 23): Guenther et al., 2012 reference needs to be updated:

Guenther, A. B., Jiang, X., Heald, C. L., Sakulyanontvittaya, T., Duhl, T., Emmons, L. K., and Wang, X.: The Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGAN2.1): an extended and updated framework for modeling biogenic emissions, *Geosci. Model Dev.*, 5, 1471–1492, doi:10.5194/gmd-5-1471-2012, 2012.

Language in some places needs to be more precise. i.e.

Page 28769 (Line 23): Change “the potential harmonize” to “the potential to harmonize”

Page 28770: May want to change “biogenic climatology” to “BVOC climatology” to be more specific Page 28770: TM5 needs to be defined Page 28772 (Line 23): may want to change “differences” to “changes” Page 28773 (Line 19): may want to change “all reaction rate data has” to “ all reaction rates have” Page 28780 (Line 6-7): This sentence needs to be rewritten. Page 28781 (Line 12): Change “a complete listed of” to “ a complete list of” Page 28784 (Line 20): Change “compliant” to “comparable” Page 28787 (Line 19): no need to have “season” before “DJF” Page 28792 (Line 13): change “ has also” to “ have also”

Page 28774 (Line 8-9): It is not clear why there is need to improve the carbon balance. Page 28774(Line 16-18): Reference is needed to support the use of nudging for spin-up purpose.

Page 28779 (Line 21-24): This is for the regional emissions and needs to be moved to the next paragraph as the next paragraph talks about the regional details.

Page 28781 (Line 10-12): There are some studies that have looked at the impact of other BVOC species other than isoprene and monoterpenes. i.e. the impacts of sesquiterpene, Sakulyanontvittaya, T., A. Guenther, D. Helmig, J. Milford, C. Wiedinmyer (2008) Secondary Organic Aerosol from Sesquiterpene and Monoterpene Emissions in the United States . Environmental Science & Technology , 42 (23), pp 8784-8790; doi: 10.1021/es800817r

Page 28784 (Line 1): While the whole paragraph is about the changes in global burdens of O3, CO, and CH4, there has been no discussion about the land-use change impacts. This may be removed or more discussion on this is needed.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 28765, 2012.

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