

We would like to thank the referee for his/her positive review of our manuscript. We have adopted most of the points raised and modified the text accordingly in the revised version of the manuscript. Below we provide a detailed response to the specific comments made.

*Page 28767 (Line to be updated to include new estimates by Guenther et al. (2012)).*

The new estimates from Guenther are now explicitly included in the text to highlight similarities and differences in the emission fluxes.

*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. Stavrakou, 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 Müller, 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. Stavrakou, T., Müller, 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.*

We have now included both of these additional references and mention to use of satellite derived estimates for both validating emission models and deriving new emission estimates.

*Page 28769 (Line 11-14): the response of isoprene to CO<sub>2</sub> 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 CO<sub>2</sub> impacts. Heald, C. L., Wilkinson, M. J., Monson, R. K., Alo, C. A., Wang, G., and Guenther, A.: Response of isoprene emission to ambient CO<sub>2</sub> changes and implications for global budgets, *Glob. Change Biol.*, 15, 1127–1140, 2009.*

We now clarify that we are discussing the release of isoprene from vegetation rather than the response of the growth of the vegetation.

*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.*

Now updated.

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

Corrected.

*Page 28770: May want to change “biogenic climatology” to “BVOC climatology” to be more specific.*

Now adopted.

*Page 28770: TM5 needs to be defined*

We now provide a definition of the acronym in the text.

*Page 28772 (Line 23): may want to change “differences” to “changes”*

Done.

*Page 28773 (Line 19): may want to change “all reaction rate data has” to “all reaction rates have”*

We feel that our original statement is more explicit.

*Page 28780 (Line 6-7): This sentence needs to be rewritten.*

Now amended.

*Page 28781 (Line 12): Change “a complete listed of “ to “ a complete list of”*

Corrected.

*Page 28784 (Line 20): Change “compliant” to “comparable”*

Done.

*Page 28787 (Line 19): no need to have “season” before “DJF”*

Now removed.

*Page 28792 (Line 13): change “has also” to “have also”*

Now corrected

*Page 28774 (Line 8-9): It is not clear why there is need to improve the carbon balance.*

Similar to other CTMs TM5 generally has a deficit in the global burden of CO therefore improving the carbon balance in the chemical mechanism via changing the stoichiometry of certain chemical reactions goes some way towards improving this. We now add this reason to the text.

*Page 28774 (Line 16-18): Reference is needed to support the use of nudging for spinup purpose.*

This statement comes from our own tests related to performing simulations with online CH<sub>4</sub> emissions where we have found that the ‘drift’ in mixing ratios is critically dependent on both the nudging timescale employed and the spin-up period. We will

clarify this in the text. To our knowledge many CTM's either fix a latitudinal gradient at the surface based on measurements or prescribe a single global mixing ratio in the lower levels (e.g. Hoor et al, ACP, 2009).

*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.*

We have now removed this sentence from the end of the paragraph.

*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*

We now mention that some studies have been performed regarding the effect of sesquiterpenes.

*Page 28784 (Line 1): While the whole paragraph is about the changes in global burdens of O<sub>3</sub>, CO, and CH<sub>4</sub>, there has been no discussion about the land-use change impacts. This may be removed or more discussion on this is needed.*

We now remove this part of the sentence in accordance with the referee's wishes.