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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How have both cultivation and warming influenced annual global isoprene and monoterpene emissions since the preindustrial era?" *by* K. Tanaka et al.

Anonymous Referee #1

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Overview:

This study analyses the evolution of isoprene and monoterpene emissions from 1854 to 2000 in relation with changes in climate and land-use. Specific impact of changing temperature, radiation and crop surface are quantified and compared, and the contribution of several regions to the global emissions is investigated.

This paper is well written and gives a clear and detailed description of the work carried out. I therefore recommand the paper for publication in ACP, and I have several suggestions to improve and clarify some aspects of the work, that I would really appreciate to be considered beforehand.

General comments:

Abstract, 3rd line: Annual emissions are indeed illustrated in the figures of the paper but emissions are not actually calculated at this time step (rather monthly), are they? Then please modify accordingly in 'we simulated the annual emissions. . .'.

Abstract, last sentence, in 'Overall, annual global isoprene emissions in 2000 were lower than in 1854, whereas annual global monoterpene emissions were higher', could you specify by how much these emissions are lower?

Section 2 Materials and Methods: could you explain what the 'T85' resolution is ?

Section 2 Materials and Methods: the description of how LAI and vegetation distribution are calculated and considered in this work could be clarified: how were the vegetation types from Ramankutty and Foley (1999) replace with those of MATSIRO, were they directly matching each other or were some combinations needed, for example ? For LAI, was a particular year chosen, or an average on several year, or was an interannual variability considered in the simulations ?

Section 2.1 with model description: To my opinion, this rather long description does not bring anything new since MEGAN is already described in the work by Guenther et al. (2006). I would therefore suggest to significantly shorten this section, focusing on the main differences and options selected in this work (for example no impact of past day or 10-days temperature, no direct impact of atmospheric concentrations on BVOC emissions) to highlight more clearly its specificities.

Section 2.2, first sentence in 'Figure 1 shows the distribution of potential vegetation': is it the past, present or future potential vegetation ?

Section 3.1, in the description of Figure 4: as boxes for the different A1 to A11 are not illustrated in the Figure, I would suggest to remind the location when mentioned in the text, to make the reading and understanding easier.

Section 3.1, description of Figure 5, and in the related caption : Please specify what

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the calculated '%' stand for: contribution of each vegetation type to the total emissions for the region considered ?

Section 3.2 and generally in the text: the authors refer most of the time to 'crop expansion'. However, as is illustrated in the Figure 5, some regions do experience for some years some decrease, rather than increase, in crop surface. I would therefore recommend to use the more appropriate expression of 'land-use change'.

Specific comments:

Abstract, 5th line before the end: replace 'emissions' by 'compounds' in '... was generally the lowest for both emissions'

Abstract, 5th line: Please specify here what 'SATs' stands for or write in full.

Introduction : replace 'Vegetation is though to emit about 90% of volatile organic compounds' by 'Vegetation is thought to contribute to about 90% of global emissions of volatile organic compounds'

Section 2 Materials and Methods: the first sentence is about 7 lines which is a bit hard to follow, could be for example cut in 2 before 'reproduced'.

In the text and in the references: change 'Serca' to 'Serça'.

Tables and Figures:

Caption Figure 2: please modify 'Targeted areas' to 'Targeted areas and related surface (in 107 km^2)'.

Figure 4: please specify in the caption how the extent of cropland is illustrated: grid fraction?

Figure 5: please add the location of the region considered, for example as titles above the plots, to help the reading.

Figure 6: I suggest to stop the X-axis to the year 2000, at which the simulations per-

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formed here stop, and not 2010, which would also give the possibility to see better the graphs. Also to me the lines do not really appear to be dashed: please modify in the text, or change the drawing, and the 'green' line is rather blue.

Figure 7 caption: please specify the unit used.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 16515, 2012.