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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of two different biogenic emission models on modelled ozone and aerosol concentrations in Europe" *by* Jianhui Jiang et al.

Anonymous Referee #2

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GENERAL

Understanding sources of uncertainties in ozone and SOA simulations are important steps for improving air pollution modelings. This study compares two different BVOC schemes and the consequent impacts on ozone and SOA in Europe. The differences between PSI and MEGAN schemes are discussed. The authors found that PSI scheme predicts more monoterpenes while the MEGAN scheme predicts more isoprene. As a result, the CTM based on PSI yields more SOA than the results based on MEGAN scheme. The topic of this study well fits the scope of ACP journal, however, some essential limits may largely weaken the scientific merits of the work.

First, the differences in BVOC are most likely attributed to those in land cover instead of schemes. In general, PSI uses an earlier version of MEGAN parameterization for isoprene and a current MEGAN parameterization for monoterpene. They should have similar responses to environmental factors such as light and temperature. The main reason why PSI and MEGAN schemes show such a large difference in BVOC emissions is that they use different land cover. The authors clarified that PSI is based on tree species while MEGAN is based on PFTs. What if the MEGAN scheme uses the same land cover as PSI, but with PFTs aggregated from tree species? The land cover should be uniform before the comparison.

Second, no BVOC observations are used to constrain simulations. Though the authors use the measurements of ozone and OA to validate model results, these are not the direct observations of BVOC. One can simulate right air pollution with wrong reasons (e.g., poor model performance, incorrect meteorology and so on). The only way to check the validity of BVOC schemes is to compare simulations with direct measurements of isoprene and/or monoterpene, which I believe there are many over Europe. Without BVOC constraints, the current study is more like a sensitivity test of ozone and SOA in CTM to any perturbations in BVOC emissions.

SPECIFIC

Page 1, line 32: "improving substantially the model performance", How do you know it improves the model for correct reason?

Page 2, Line 38: "highest over all the model inputs" What kind of inputs? Specify.

Page 4, Line 3: "Initial and boundary conditions were . . ." What kind of IC and BC? Specify.

Page 5, Line 31: "The value of 0.1 is used for MT in MEGAN2.1, while the values are between 0.065 to 0.077 . . . in PSI model" Why the PSI model uses different parameters while it uses the same scheme as MEGAN?

Page 6, Line 3: “canopy model” What’s the impacts of different canopy models on the simulated light availability for PSI and MEGAN models?

Page 6, Line 30: “The variation of biomass density in MEGAN was simulated by the satellite data” How the satellite data simulates biomass density?

Page 7, Line 27: “To demonstrate the seasonal differences”. The word “demonstrate” is not appropriate, better to use “evaluate” or “quantify”.

Page 8, Line 7: “observed” This is not observation. Better to use “found”

Page 8, Line 14: “In winter, highest isoprene emissions occurred in Central Europe for PSI model” Why there are isoprene emissions in winter when leaf biomass is set to zero.

Page 9, Line 13: “observed”, again not observation. Better to use “calculated”

Page 9, Line 28: “background”, where is the background ozone from?

Page 10, Line 11: “and” should be “but”

Page 11, Section 3.2.3: Not sure whether this section is necessary as BVOC has minor impacts on SIA

Figures 3 and 4: Why in CE, isoprene is much higher for PSI but ozone is still lower than MEGAN?

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