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# *Interactive comment on* "Isoprene oxidation products are a significant atmospheric aerosol component" *by* S. N. Matsunaga et al.

**S. N. Matsunaga et al.**

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Thank you for your comments.

There are 3 factors which could make uncertainties; those are the estimate on humidity, NOx, ozone and isoprene concentration by MOZART, production yields by the NMM and aerosol partition ratio (APRs) by the equation based on the measurements. I thought it is not realistic that all values are minimum or maximum at the same time. As the reviewer said, if I would calculate the minimum and maximum, the range must be larger. But I don't think the range will be realistic. I believe these responses below can also answer to the comments by Kroll et al.

(1) We would do so.

(2) The model simulations shown here were constrained with data collected during the CELTIC study at Duke Forest in North Carolina. The boundary layer dynamics and meteorology most likely controlled the “dips” observed in the concentrations. Since boundary layer and mixing parameters were not measured specifically during the study, we were unable to constrain these variables in the model simulations. Therefore, we used best-guess estimates. Because the model simulated the relative magnitude and approximate timing of the concentrations, we have assumed that, within the uncertainties of the model, it reproduces the measurements fairly well.

(3) I had looked for relationships of aerosol partition ratio (APR) with temperature, aerosol mass, aerosol number and surface area using multiple regression in Moshiri study, but couldn’t find significant relationship except for relative humidity. I agree with the reviewer and also feel this is strange but these factors didn’t make significant difference in previous experiment.

(4) I agree with the reviewer at the point that there is a parameter missing. But, as mentioned in (3), temperature and aerosol mass didn’t seem to be working as important parameters to control the APR. In addition, we don’t have data for aerosol mass and number in same diameter range for all experiments described in this paper.

(5) We would do so.

(6) We will add the explanation.

(7) The NCAR Master Mechanism box model simulates the boundary layer growth using a fairly basic parameterization and calculates photolysis rates using the TUV model [for example, see http://www.acd.ucar.edu/Science/Models/TUV/index.shtml]. Cloud cover was assumed based on measurements and notes from the field study. Boundary layer heights were not measured during the campaign. Because the model was not constrained by observations of these variables, it is likely that the model did not simulate exactly the diurnal profile of the measured concentrations. The minimum concentrations observed at mid-day could have been the result of increasing clouds and



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a change in the boundary layer depth. Because these variables were not measured in the field, we were unable to confirm this with the model simulations. The modeled concentrations go to zero at night, whereas the observations do not. As noted before, the model simulations were constrained with measured concentrations of atmospheric trace gases. Since many measurements were not available during the nighttime hours, we were unable to constrain the model during this time period. A missing nighttime source of these compounds could very well be missing (i.e., transport into the area that is not captured by the model). Additionally, uncertainties in the deposition rates of these compounds in the model framework could also lead to incorrect concentrations.

(8) The factor which makes the largest uncertainty is MOZART output for NOx, isoprene and ozone concentration, those were needed to estimate the chemical production yields of the compounds. The uncertainty was assumed to be 200%. Scatter on the APR estimate makes only around 50%. Detailed description about assumption and calculation on these errors will be added to the revised version.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11143, 2005.