

Interactive comment on “Global atmospheric budget of simple monocyclic aromatic compounds” by David Cabrera-Perez et al.

Anonymous Referee #1

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This paper presents global model simulations and their evaluation with observations of aromatic compounds (primarily benzene, toluene, xylenes). Aromatics are a significant component of tropospheric chemistry and important ozone and aerosol precursors in urban areas. The chemistry scheme used to represent individual compounds and their oxidation products is a somewhat simplified version of the Master Chemical Mechanism, but is much more explicit than generally used in global models.

This paper is a valuable contribution to the literature and I recommend publication after addressing the comments and corrections given below.

Abstract and throughout paper: Emissions, burden and loss rates of total aromatics should be reported in TgC as the individual aromatic species have different molecular weights.

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Abstract, l.4: the current wording implies the emissions are a result of the model simulation, where as the anthropogenic and biomass burning amounts are determined by the emissions inventory used. You might want to re-phrase that sentence.

p.3, l.5: Guenther et al., 2012 should be cited here, and other places throughout the paper, instead of Sindelarova. Whenever you are referring to a fundamental or general aspect of the MEGAN biogenic emissions. Sindelarova presents an application of the MEGAN model, but did not develop the model, or determine which species have biogenic emissions.

p.3, l.10: Replace “Besides, there is” with “In addition, there are”

p.3, l.24: Place ‘e.g.’ at the start of the reference list.

p.3, l.26-27: re-write - not clear currently if Henze looked at SOA or not.

p.3, l.29: give the chemical formulae of each compound.

Table 3: Units are g-species per kg-(dry matter burned)? state more explicitly. Would be helpful to also list totals as TgC/yr.

p.6, l.8: rewrite “does not present such amount” Do you mean doesn’t include them, or doesn’t indicate them separately?

p.6, l.15: Guenther et al., 2006 only presents isoprene emissions. Do you mean MEGANv2.1 (Guenther et al., 2012)?

Table 4: Observations are really the reference for the model, so it would be more appropriate to give the ratio of the models to the observations: MLIT/Mobs and MRCP/Mobs.

Figure 2: How are the model results compared to the mountain sites? Do you interpolate the model value to the pressure of the observation sites (correct way), or do you just use the surface model value (probably not correct - as the model probably does not resolve the topography of the mountain site).

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Figure 4: I do not find this figure very informative - the model results in Asia are not visible. Small points could be used to indicate the obs. locations, then plot model vs obs in a scatter plot.

p.14, l.15: What do you mean by a “bad representation of the sinks”? That OH is too high? Explain further.

p.14, l.16-18: How do you treat the observations that are below the detection limit? Rewrite these sentences.

Fig. 6: The large difference at Hohenpeissenberg could be due elevation differences between model and obs. (see comment about Fig. 4).

p.15, l.7: HCs are not removed by wet deposition.

p.17, l.9: ‘Coherent’ -> ‘Consistent’. I don’t understand what the location of the emissions (NH) has to do with the seasonal cycle.

p.17, l.13: ‘totals’ instead of ‘sums up [to]’

p.17, l.15: rewrite to: ‘on the order of a day or less’

p.18, l3: ‘asses’ should be ‘assess’

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