

Interactive comment on “Validation of emission inventories by measurements of ambient volatile organic compounds in Beijing, China” by M. Wang et al.

Anonymous Referee #1

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Overall, the manuscript is a solid evaluation of NMVOC emission inventories using measurements throughout Beijing. The authors employ a variety of measurement techniques and analysis methods to assess NMVOC emissions from spatial, temporal, and species specific aspects. More such studies are needed in other locations to improve NMVOC emission inventories.

General Comments: There are a few specific items which could be addressed to improve the paper, however, generally, the paper is quite well written. There is one exception to this, which I address in the specific comments, but also mention here for emphasis. Of the CMB assessment measures, the chi-square, is not within the target

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range. These results should be revisited and this fitting statistic explained or the model re-run, since this could, in theory, have a significant effect on the CMB results. I don't expect that it necessarily will, but better to assess this than to make assumptions.

Specific Comments

(1) P26943L8: This sentence mentions that the chemical composition of ambient VOCs can be affected by their emission and their photochemical removal or formation. Agree, however, the reference to 'by their emission' is not clear. The chemical composition is initially determined by the relative amounts contributed from the various VOC emission sources, is this what is meant? If yes or no, please clarify, because as written it is not really grammatically correct, but is therefore also confusing as to what is meant.

(2) P26943L20-27: When discussing isoprene as an anthropogenic source, it may be of interest to also compare to earlier papers by A. Borbon et al. in *Atm Env* 2003 or *Sci of the Total Env* 2002, although they are not from measurements in China.

(3) P26945L23-25: For consistency with some of the papers listed earlier in the section, it would be nice to state the correlations as r^2 values instead of just r .

(4) P26945L25-27: One of the explanations for the poor correlation with CO is listed as photochemical processing, which the Figure that is shown supports. However, there are also other possibilities, such as greater influence of other sources – while vehicle emissions dominate, other sources could have a significant impact and thereby influence the correlations. It might be worth mentioning this and any other possibilities, while acknowledging that the figure you show would tend to indicate photochemical processing.

(5) P26949L24-27: It is unclear if just the 2011 measurements were at the PKU site or all of them. I would assume the others, being from other studies, were measured elsewhere. It would be worth clarifying because this would be a factor that might come into play in the subsequent sentences where comparisons are made.

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(6) P26954L17-20: The CMB model performance parameters listed are within acceptable intervals for the r^2 , however the chi-square (χ^2) value has a target range of 0-4, not 2-6, as was mentioned. Taken directly from the EPA CMB information: 'A large CHI SQUARE (>4.0) means that one or more of the calculated species concentrations differs from the measured concentrations by several uncertainty intervals. The values for these statistics exceed their targets when: 1) contributing sources have been omitted from the CMB calculation; 2) one or more source profiles have been selected which do not represent the contributing source types; 3) uncertainty estimates of receptor or source profile data are underestimated; and/or 4) source or receptor data are inaccurate.' If these results are to remain as they are it would be necessary to justify why the chi square value is acceptable in the 2-6 range, otherwise the CMB results may need to be re-assessed.

(7) Section 3.4.3: while the differences in the previous works and this study are pointed out and certain discrepancies explain, there are no further explanations or possible explanations included as to, for example, why the solvent contribution was so much lower than some of the other inventories. Some information here might be warranted, or an acknowledgement that at this point, these differences cannot be explained.

Technical Corrections

(1) P26934L6: distributions should be singular, 'distribution'

(2) P26935L5: remove 'complex'

(3) P26939L24-25: '... were given priority.' Were given priority for what? This sentence is not clear.

(4) P26942L7-9: please specify how many NMHCs or carbonyl compounds were included in each sum.

(5) P26952L21: 'constrains' should be 'constraints'

(6) P26953L4: 'influence' should be 'influenced'

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(7) P26955L9: '... into atmosphere; and ...' Should be '... into the atmosphere; and ...'

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