

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2020-1268

Anonymous Referee #2

Referee comment on "A mass-balance-based emission inventory of non-methane volatile organic compounds (NMVOCs) for solvent use in China" by Ziwei Mo et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1268-RC2>, 2021

This manuscript presents a long-term NMVOCs emission inventory of solvent use during 2000-2017 in China. Based on a mass (material) balance method, NMVOCs emissions were estimated for six categories, including coatings, adhesives, inks, pesticides, 35 cleaners and personal care products. This paper deal with an important issue of NMVOCs emissions from solvent use, which is a major precursor of ozone and fine particle pollution. Strength of this work is to use of direct activities of VOC-containing product consumption statistics for mass balance-based estimation methodology(eq. 1). Several weaknesses, however, are also found in this paper such as, use of national level statistics, lack of I/S VOC result, non-sector specific control application, and weak discussion in general.

I, therefore, think this manuscript need to be improved further to be considered for publication. Followings are my review points and suggestions.

[Major Comments]

- Page 5, 12, 13 : Estimation of VOCs emissions using production-consumption data (i.e. mass balance-based estimation) should be more accurate way of estimating VOC emissions, compares to EF-based estimation. The inter-comparison to the various EF-based results (e.g. MEIC, Sun et al., etc.) show higher or lower level of agreement depend on the sectors. I strongly recommend authors to discuss deeper for reason of different agreement levels by sector. If possible, subsector level discussion using Table S13 would help understanding differences among EF-based vs. MB-based approach. I think it would be one of the most important knowledge that this work can contribute.
- Page 6 and 10 : Province level emissions would better be presented as a map with provincial VOCs composition graphs on it, in addition to Figure 3. Considering VOCs' atmospheric lifetime, the level of spatial detail(i.e. national level) in emission estimation is limited. Since the top-down allocation(from national to provincial) using the proxy data(Table S7) is not quite accurate methodology, authors need to discuss

more on limitations introduced by national level estimation then downscaling, not directly estimated using local(provincial) statistics as in some EF-based estimation.

- Page 7, 10, 11, Text S1 : Chemical speciation should be a very important part of the VOCs estimation. The way they were estimated, however, are not clearly presented and discussed in this manuscript. Authors are required to expand Text S1 and Figure S3-S12 to state more detail data and procedure for the chemical speciation, which can support species-based results in the page 11.
- Page 5, 6: Estimation of S/IVOCs are presented in the Eq 1. and 2., but not stated further in the manuscript. Since the importance of I/SVOCs emissions are growing, I recommend adding contents and discussions for them.
- Page 8, 9, 13, Figure 2, 9 : VOC emission control stated only for industrial production (i.e. industrial process) in "3.1 Control of NMVOCs emissions" section which is limited. Analysis of emissions control in manufacturing industry would better be sorted by not only control technology (Table S8) but type of industry (i.e sub-sectors). Since much of emissions coming from the consumption process, authors need to add contents and discussion on this process. For example, application of water-based vs. solvent-based paint with respect to national/regional control policies. I suggest to merge control-related contents in the section 4.3 (also, in Figure 9), need to be merged in the section "3.1 Control of NMVOCs emissions."
- Page 13: Contents in the "4.2. Comparison with other source" mostly discuss about the cross-sectoral importance changes using other references. I would suggest to shrink and move to introduction and/or conclusion chapters.

[Minor Comments]

Page 6 : Authors state that "Uncertainty is set to be $\pm 30\%$ if data are directly from official statistics; uncertainty is assumed to be $\pm 80\%$ if activity data is estimated from other statistical information or reports." How could authors set these values? Form Wei et al, 2011a? Please elaborate more.

Page 26: Description for (a) and (b) need to be switched.