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Comment on acp-2021-280

Anonymous Referee #2

Referee comment on "Measurement report: High contributions of halocarbon and aromatic compounds to atmospheric volatile organic compounds in an industrial area" by Ahsan Mozaffar et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-280-RC2, 2021

The GC-FID/MS observations of VOCs in an industrial area in Nanjing were analyzed to characterize seasonal VOCs and their effects on OH reactivity and the productions of ozone and SOA. The observations are valuable and the analysis is comprehensive including PMF, PSCF, OFP, SOAP, EKMA, and RIR. Most results are reasonable although some of the interpretations are questionable. The description of the analysis can be more refined, and I suggest that the authors consider the following issues:

- The writing of the paper obscured the fact that the observations were not continuous. The dataset includes ~ 1 month in winter, spring, and summer and 3 months in autumn. Some of the differences in comparison to other studies may be due to the comparison of 1 month data to a season.
- I do not suggest including halocarbons in TVOC comparison. Halocarbons are not reactive and do not contribute significantly to OH reactive or the productions of ozone and SOA. There are good reasons for not including halocarbons in TVOC data in previous studies. In the discussion of Line 250-260, it is unclear if and what halocarbons and OVOCs were included in TVOCs in previous studies. Not knowing that, the comparison results can be misleading.
- The discussion of section 3.3.1 can be removed. T/B ratio is meaningful only if they are from a single source. The PMF results show that T and B are from multiple sources and T/B ratio is not meaning. The same argument applies to the ratios of alkanes or aromatics to acetylene.
- The PMF results are confusing. In summer, for example, ethane is from vehicle, isopentane is from biogenic sources, ethane and propane are from vehicles, and propane is from solvent use. None of these make much sense. It’s more or less the same for other seasons. In autumn, biomass burning has ethane but not acetylene. In winter, vehicle 1 and 2 are similar. Spring and autumn have gasoline evaporation, but summer and winter do not. Gasoline evaporation should be largest in summer. LPG/NP does not have ethylene in spring but has most of ethylene in winter.
- PSFC analysis is applicable only to VOCs that are short lived because the backtrajectories are only 24 hours.
- I do not feel OFP and SOAP analyses are useful (although they are often included in

VOC papers). Figures 7 and 8 show that VOCs have much higher OFP and SOAP in winter than summer, which is technically true but we know the contributions of VOCs to ozone and SOA are much larger in summer than winter.

- The EKMA diagrams of Figure 10 show ozone at ~50 ppbv for 100% NOx and VOCs in summer. Ozone here is daily 1 hour maximum, I think. 50 ppbv seems low for daily 1 hour maximum in summer. One possible reason is that the Thermo chemiluminescence instrument can severely overestimate NO2 because of the conversion of NOy to NOx.
- "Halocarbons" was mis-spelled in several places.