Comment on acp-2020-1298

Anonymous Referee #1

Referee comment on "OMI-observed HCHO in Shanghai, China during 2010–2019 and ozone sensitivity inferred by improved HCHO / NO2 ratio" by Danran Li et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1298-RC2, 2021

This study examined long-term HCHO columns in Shanghai with OMI and ground-based remote sensing observations. The author also studied the ozone sensitivity in Shanghai and proposed a correction factor to satellite HCHO to NO2 ratio. The authors found that applying such a correction results in ozone formation is more likely to be under the VOC-limited regime. In my view, this work is among few studies exclusively focusing on HCHO observations and ozone sensitivity in China, thus is appropriate for publication at ACP subject to the following concerns.

The authors examined monthly averaged columns at a spatial resolution of 0.01x0.01 degree. I am not sure whether there would be enough pixels in each grid cell to reduce the uncertainty in mean HCHO column to a much lower and acceptable level. This could be a potential issue in the winter seasons when SZA is high and the light path is long.

Did the authors correct the well-known drift in OMI SAO HCHO product? If not, please do so and update the results accordingly.

In page 7, please clarify how to get the HCHO emission rate? Is HCHO mainly secondary? If so, how to determine HCHO yields from NMVOCs? The authors may also want to consider the lower HCHO yields from NMVOCs as NOx emissions drop in the study period.

Minor comments:

Page 2, line 39-40, please include GOME-2 A, B, and C

Page 3, line 76, please change "in a day" to "in the daytime"

Page 3, line 80, please change "pixels" to "rows"

Page 3, line 81, here and elsewhere, please change "~" to "-". "~" means "approximately"

Page 3, line 92-93, I think by using MainQualityFlag=0 as the criterion, you have filtered out pixels affected by row anomalies already.

Page 5, line 127-129, could you please explain the spatial variations in HCHO columns. Is

the spatial pattern consistent with emissions?