Comment on acp-2021-476
Anonymous Referee #1

Referee comment on "Recent ozone trends in the Chinese free troposphere: role of the local emission reductions and meteorology" by Gaëlle Dufour et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-476-RC1, 2021

This paper addresses important issues for understanding the evolution of ozone pollution over China and how it is responding to air quality regulations. This is a complicated problem so although this study does not resolve discrepancies between data sets, it is a careful analysis and represents an advancement in our understanding of Chinese ozone pollution. I recommend publication once minor issues are addressed.

Specific comments:

p5 line 8: I could not find references at https://quotsoft.net/air/ regarding the accuracy and precision of this data. Please provide more information and/or other references that use the data.

p7 line 1: Zheng et al., 2018 uses the MEIC inventory – I assume that also used here? This should be stated explicitly since there are other bottom-up inventories for China, e.g., as mentioned in Zheng, B., et al., (2018), Rapid decline in carbon monoxide emissions and export from East Asia between years 2005 and 2016, Environ. Res. Lett., 13(4), 044007, doi:10.1088/1748-9326/aab2b3.

p8 line 12: Could the lower bias and degraded correlation with IASI-IAGOS compared to IASI-ozonesondes also be related to the assumption of a vertical profile at the lat/lon of the mid-point in a slanted profile? This might explain the low bias in the lowest layer since those measurements would be taken closer to urban areas near the airport.

Fig. A1: In addition to the 2014-2017 mean and statistics, it would be useful to see the trends in ground station observations compared to the model surface ozone.

Wording change suggestions:

p2 line 15: “have been applying” to “have been enacted”

p3 line 3: “In this study, we question the ability...” to “In this study, we examine the ability...”

p3 line 8: “Results are also discussed in light with the TOAR outcomes” to “Results are
also contrasted with the Gaudel et al., (2018) TOAR outcomes”

p4 line 28: Since validation references are not given in this section, I suggest adding a line: “Initial validation of the KOPRAFIT IASI ozone retrievals with ozonesonde and IAGOS data is presented in Section 3.”

p8 line 14: “worse” to “lower”

p9 line 23: “less than 300 data” to “less than 300 profiles”?

p11 line 19: “desertic” to “desert”

p11 line 21: “This region should not be considered here.” to “This region is not considered here.”

p11 line 24: “This translates even stronger to the model” Not quite sure what is meant by this– maybe “This feature becomes even stronger in the model when AKs are applied”?

p17 line 2: “nuding” to “nudging”

p19 line 20: “These results seem to comfort the consistency” to “These results corroborate the consistency”

p19 line 25: “and the caution to take to not overinterpret the results” to “and the need for caution to prevent overinterpreting the results.”

p20 line 12: “Some individual studies exist but once again they do not allow one to conclude” Conclude what?

p21 line 23: “leads to reduce” to “further reduces”