Comment on acp-2022-462
Anonymous Referee #1

Referee comment on "Temporal variability of tropospheric ozone and ozone profiles in the Korean Peninsula during the East Asian summer monsoon: insights from multiple measurements and reanalysis datasets" by Juseon Bak et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-462-RC1, 2022

This paper is technically valuable to set up the a-priori dataset for satellite retrieval. Also, it is valuable to understand the characteristics of ozone profiles in East Asia. The manuscript is well organized to understand the main purpose of this study, although some typo-error and abbreviation expression are missed.

However, some improvements are required before the publication.

1) L49-58: In the beginning of the Introduction, two paragraphs are not directly related. Please change the paragraph order.

2) L60-62: Is that mentioned for the tropospheric ozone or surface ozone? Surface ozone is still doubtful to consider the affection by the transport from the stratosphere.

3) L71-76: I think that these sentences are not too directly related to any other former sentences. Is that intended to characteristics of EASM? If so, please re-write and change the sentences to before L63. If you intend the ozone-EASM relation, you need to add the chemical status of model.

4) Section 2.1: The ozonesonde and surface in-situ measurements can categorizing the "In-situ". However, the importance of ozonesonde is very high in this manuscript. For this reason, please separate the section to "ECC ozonesonde". And detailed explanation is essential, such as the previous studies and heritages of analysis by using the Pohang ozonesonde datasets and detailed uncertainty and biases of ECC ozonesonde by considering the manufactures.
Furthermore, the original observation data of ozonesonde has large uncertainties and some measurement noise errors due to several reasons. For this reason, many of the studies are additionally processed before using the data. For this reason, the author should be also mentioned how the original observation data would be processed.

5) Section 2.2: How about to consider the low tropospheric sensitivity? Because both MLS and OMI are insensitive to the low tropospheric ozone.

6) Section 2.3: From Park et al. (2020), some accuracy and characteristics of reanalysis data were listed. They made a conclusion of CAMS & MERRA-2 characteristics both for stratosphere and troposphere, and the reanalysis data has different accuracy characteristics in troposphere and stratosphere. This different uncertainty characteristics is hard to identify the characteristics of ozone profiles using reanalysis data. As you consider this kind of characteristics, is the analysis confident based on the reanalysis data? In addition, the accuracy characteristics of CAMS and MERRA-2 is different according to the stratosphere and troposphere. The author have to be consider the vertical dependence of uncertainties for reanalysis data for the analysis/

7) L164-165: Only from Figure 1, we can't clarify this sentence. Please add another results to back-up this sentence.

8) From Figure 2 and Table 1, the correlation between ozone and meteorological variables are shown. However, these statistical results only showed the strong relationships, not detemined to "Cause and Effect".

9) Figure 3: Pohang is east coast of Korean Peninsula. It means that the South-west wind is transport from land. I think that the South-west wind is not always "poor-ozone airmass".

10) L210: To explain the tropopause characteristics, is "the rise of the tropopause" also satisfied in Pohang? Please add the reference or additional analysis.

11) L217: What is "Chemical barrier"? It is too ambiguous. Also, Figure 4 mentioned the correlation characteristic change in 300 hPa. However, this result is analyzed by the long-term datasets. So, this is not suitable to express the special transport phenomenon for STE.

12) L227-232: To describe the vertical diffuse structure, the monthly averaged value is
not suitable. Do you have some specific profile cases to support this sentence?