



EGUsphere, referee comment RC1
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Comment on egusphere-2022-1366

Anonymous Referee #1

Referee comment on "Why is ozone in South Korea and the Seoul metropolitan area so high and increasing?" by Nadia K. Colombi et al., EGUsphere,
<https://doi.org/10.5194/egusphere-2022-1366-RC1>, 2022

General comments

The manuscript by Colombi et al. (2022) explores the 2015-2019 trends in surface ozone and NO₂ concentrations over South Korea and the Seoul Metropolitan Area (SMA) using observations and the GEOS-Chem model. The authors 1) quantified emissions-driven trend in ozone and NO₂ concentrations by removing the effect of meteorological variability during the period, 2) successfully simulated surface ozone over South Korea and China by including recent model chemical updates, and 3) identified factors deriving high surface ozone and increasing trends over SMA.

The manuscript is well structured and the findings are useful not only to academia but also to policymakers. I support the publication of this manuscript with minor revisions mostly asking for clarification.

Specific comments

- **Use of 90th percentile MDA8 as a metric**

As highlighted in the introduction (L45 - 46), there is no monitoring site that complies with the MDA8 national air quality standard in South Korea. It is more urgent to grasp the overall status of MDA8 (mean or median MDA8 as a proxy) or the low concentrations (10th percentile MDA8 as a proxy) rather than high concentrations (90th percentile MDA8 as a proxy) for practical applications. Therefore, I recommend using mean, median, or 10th percentile MDA8 rather than 90th percentile MDA8 as a metric.

- **Figure 1 and 2 lower panels**

Adding the same metric for South Korea with different color will be helpful in showing relative ozone pollution in SMA compared to the national average.

- **Section 3 and 4 titles (L105)**

These sections are for SMA only. Please clarify in the title, too.

Technical corrections

- L25 – 26: ~find an emission-driven ... while NO₂ decreases by 22%.

Please rephrase. It is unclear whether the NO₂ decrease is from emissions or surface observations.

- L33: ~, we find that SMA ozone would still remain above 80 ppb ...

What about other parts of South Korea? Because the analysis of South Korea and SMA are mixed, the focus often gets vague.

- L43 – 46: In 2015 ... continued to increase (NIER, 2020).

MDA8 of 60 ppb is a national air quality standard not limited to SMA.

- L123: ~ for NO₂

A period is missing next to NO₂.

- L153: ~thus the seasonality ... VOC-limited conditions.

Please rephrase. I don't understand what you mean here.