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Reply on RC1

Zhaojun Tang et al.

Author comment on "Discrepancy in assimilated atmospheric CO over East Asia in 2015–2020 by assimilating satellite and surface CO measurements" by Zhaojun Tang et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1035-AC1, 2022

The paper evaluates the effects of satellite and surface measurements on atmospheric carbon monoxide assimilation over East Asia. It is well-written and can provide valuable information for numerical studies on atmospheric carbon monoxide. I recommend the publication of the paper after the following issues have been addressed. The authors showed the underestimation of the modeling on surface carbon monoxide by comparing the a priori simulation with observations in the first two Figures. However, in the latter part of the paper, how much will the data assimilation with different types of carbon monoxide measurements improve the simulations is not evaluated. The authors can add some statistical metrics in the examinations, for example, the correlation coefficient and absolute bias.

Answer: Thank you for the comments! Table 2 was revised to provide more detailed validations for the assimilation effects. We find the assimilations led to significant improvement in assimilated CO concentrations:

- Surface CO: the a priori, a posteriori (by assimilating raw MEE CO observations) and MEE CO observations are 397, 631 and 781 ppb over E. China in 2015-2020.
- Column CO (Xco): the a priori, a posteriori (by assimilating MOPITT CO column data) and MOPITT CO observations are 97.4, 124.1 and 128.6 ppb over E. China in 2015-2020. Here the modeled CO profiles were smoothed with MOPITT averaging kernels.