Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC2
https://doi.org/10.5194/gmd-2022-138-RC2, 2022

Comment on gmd-2022-138

Anonymous Referee #2

Referee comment on "Assessment of tropospheric ozone products from CAMS reanalysis and CAMS daily forecast using observations over north and northwest of Iran" by Najmeh Kaffashzadeh and Abbas Ali Aliakbari Bidokhti, Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2022-138-RC2, 2022

The present study applies an interesting approach to decompose time series of surface ozone concentrations over two cities of Iran for two CAMS atmospheric composition global products and observations. Although I find the idea quite interesting, I see essential limitations in the design and application, which make me suggest rejection of publication of the present version of the study in GMD. Please find below my comments:

- My main concern is that the study is quite regional. A country-based focus is itself regional, especially when the study presents results for only two cities. As the other Reviewer also stated, you present results for only two grid-points (at least for CAMS reanalysis), a fact that is not helping in drawing safe conclusions. What is the scientific significance/interest of a paper assessing CAMS O3 (global) products over only two cities? My suggestion is to spatially extend the focus of the study including more stations from Iran (if available) and/or other neighboring countries to extract more robust findings and increase the scientific interest of the paper. Something also interesting would be to apply your approach over Europe and include in the analysis the CAMS-regional forecast of atmospheric composition exploring also the added value that CAMS regional models bring (?).
- The differences in the S term are mostly attributed to chemistry. What about deposition? Uncertainties in emission inventories? Stratospheric ozone contribution is not referred at all, yet, the broader Iran region is a well-known hot spot of stratosphere-to-troposphere transport that might affect day-to-day O3 variability in some cases. More discussion is needed in the interpretation of the results.
- P8L226-228: Both CAMS reanalysis and CAMS NRT are assimilated products. More details are needed here about the differences in assimilation process between the two products that might be related to the diferences in the performance of dfr and dfa.
- What data are used for the MLR models? Do you use the reanalysis and analysis NOx, AT, WS, WD data for the MLR of the respective dfr and dfa?
- P3L67: “Despite the well performance of CAMS in the upper troposphere,..”. This is not the case according to recent evaluation studies like those of Inness et al. (2019), Huijnen et al. (2020), Wagner et al. (2021) and Akritidis et al. (2022). CAMS reanalysis ozone in the upper troposphere is found biased and this is probably associated with the

assimilation process. This is something that needs to be noted in the manuscript.

Akritidis, D., Pozzer, A., Flemming, J., Inness, A., Nédélec, P., and Zanis, P.: A process-oriented evaluation of CAMS reanalysis ozone during tropopause folds over Europe for the period 2003–2018, Atmos. Chem. Phys., 22, 6275–6289, https://doi.org/10.5194/acp-22-6275-2022, 2022

Huijnen, V., Miyazaki, K., Flemming, J., Inness, A., Sekiya, T., and Schultz, M. G.: An intercomparison of tropospheric ozone reanalysis products from CAMS, CAMS interim, TCR-1, and TCR-2, Geosci. Model Dev., 13, 1513–1544, https://doi.org/10.5194/gmd-13-1513-2020, 2020

Inness, A., Ades, M., Agustí-Panareda, A., Barré, J., Benedictow, A., Blechschmidt, A.-M., Dominguez, J. J., Engelen, R., Eskes, H., Flemming, J., Huijnen, V., Jones, L., Kipling, Z., Massart, S., Parrington, M., Peuch, V.-H., Razinger, M., Remy, S., Schulz, M., and Suttie, M.: The CAMS reanalysis of atmospheric composition, Atmos. Chem. Phys., 19, 3515–3556, https://doi.org/10.5194/acp-19-3515-2019, 2019

Wagner, A., Bennouna, Y., Blechschmidt, A.-M., Brasseur, G., Chabrillat, S., Christophe, Y., Errera, Q., Eskes, H., Flemming, J., Hansen, K. M., Inness, A., Kapsomenakis, J., Langerock, B., Richter, A., Sudarchikova, N., Thouret, V., and Zerefos, C.: Comprehensive evaluation of the Copernicus Atmosphere Monitoring Service (CAMS) reanalysis against independent observations: Reactive gases, Elementa: Science of the Anthropocene, 9, 00171, https://doi.org/10.1525/elementa.2020.00171, 2021