The study introduces the concept of constrained EnKF that is used to improve estimation of CO_2 in the GEOS-Chem model by conserving the mass of CO_2 in analysis updates. The study is important to this field and it is believed that authors spent lots of efforts on preparation of data, implementation and interpretation, however, as the reviewer pointed out, the writing skills are very disappointing, there are too many typos, grammar errors, wrong choices of wording and incomprehensible phrases. There are much more than the reviewer already listed. Reviewers are primarily supposed to provide scientific evaluation of the work. Therefore, I strongly suggest that authors do careful cross proof-reading in the revision.

There are some other comments from my side:

1. They are too many abbreviations. They are very disturbing while reading. Use abbreviations only if they are necessary. For example, it is unnecessary to use "AW" for "assimilation window".

2. It would be much easier to understand the mathematical expressions if authors can use thin, bold and bold capital to differentiate scalar, vector and matrix.

3. Throughout the paper, it is not natural to use the word of "priori" instead of "background" while using "analysis" (not posterior).

4. Can authors provide a flow chart for the algorithm of LETKF+CEnKF? It would be helpful to understand how the algorithm works.

5. Can authors illustrate differences between assimilation window, observation window and overall window for the run-in-place method?

6. Can authors explain why the RTPS can maintain mass conservation? I am not sure about this.

7. Can authors explain more clearly how the initial ensemble is created? Is it a time-lag ensemble?

8. Since OSSE is done in this study, I assume that the observations are created by adding the noise to truth. But it seems that real observations are used. Can authors make this more clear in the text?

9. If I understand correctly, authors use the mass of background ensemble mean as the proxy for true value. However, this is not the ideal choice, for example, due to forecast error. Can authors provide some discussion on this?

10. Authors show the importance of mass conservation constraint within data assimilation. Does the constraint have some feedback effects on dynamical components of the model? Have authors also considered the impacts on the long-term forecasts? Is it important?

11. Line 73-74: Zeng and Janjic 2016 showed the LETKF can violate the conservation properties (e.g., total energy and enstrophy), and Zeng et al. 2017 introduced a new algorithm which can conserve non-linear properties. However, their studies have not showed the imbalanced dynamics. For imbalance, it is more appropriate to cite other papers, e.g., Greybush et al. 2011, Bick et al. 2016 or Zeng et al. 2021a,b.

Greybush, S. J., E. Kalnay, T. Miyoshi, K. Ide, and B. R. Hunt, 2011: Balance and ensemble Kalman filter localization techniques. Mon. Wea. Rev., 139, 511522.

Bick, T., Simmer, C., Trömel, S., Wapler, K., Stephan, K., Blahak, U., Zeng, Y., and Potthast, R.: Assimilation of 3D-Radar Reflectivities with an Ensemble Kalman Filter on the Convective Scale, Quart. J. Roy. Meteor. Soc., 142, 14901504, 2016.

Zeng, Y. and Janjic, T. (2016). Study of conservation laws with the local ensemble transform Kalman filter. Quart. J. Roy. Meteor. Soc., 699 , 2359-2372.

Zeng, Y., Janjic, T., de Lozar, A., Welzbacher, C., Blahak, U. and Seifert, A. (2021a). Assimilating radar radial wind and reflectivity data in an idealized setup of the COSMO-KENDA system. Atmos. Res., 249 , 105282.

Zeng, Y., de Lozar, A., Janjic, T. and Seifert, A. (2021b). Applying a new integrated mass-flux adjustment filter in rapid update cycling of convective-scale data assimilation for the COSMO-model (v5.07). Geosci. Model Dev., 14 , 1295-1307.