

## Responses to Topic Editor:

Thanks topic editor for providing me suggestions. The comments are reproduced (black) along with our replies (blue). We have made the revisions below:

Throughout: Please remove colons before equations and punctuate correctly. Equations should be numbered.

I have removed the colons before equations and name the Equations.

Line 27/28 (abstract): Please define RMSE.

I have replaced the RMSE in line 27 28 by root mean square errors.

Line 72-74: This does not make sense. Are you trying to say "The background error covariance matrix, which represents the uncertainty in the ensemble simulations, is determined by the spread of the ensemble members (Peng et al., 2017)." ?

I have modified.

Line 76-77: "In addition" is not needed here.

I have modified.

Line 78: Contraing -> constraining

I have modified.

Line 89: "While" is part of the citation

I have modified.

Line 97: "there are few researches" -> "there is little research that"

I have modified.

Line 135: Please make this URL a citation in the bibliography.

I have modified.

Line 234: Please make this URL a citation in the bibliography.

I have modified.

Line 251: What is m here? Please define.

m is the mean value of daily concentration. I have modified.

Line 262: What is \* in this equation? An operator or something different?

Written error, I have modified.

Line 271: Please make this URL a citation in the bibliography.

I have modified.

Line 687: Please make the zenodo URL a properly reference citation. This section contains an acknowledgement, which should be moved to the acknowledgements. Please add where the reader can find the additional data and models needed to make this work reproducible, i.e the version of WRF-Chem used, observations and other model inputs.

I have modified.

The problem about Figure 1(a), I think we could add a statement that some figures contain disputed territories. Thank you very much.