Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC4
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Comment on acp-2020-1129

Anonymous Referee #3

Referee comment on "Quantification of uncertainties in the assessment of an atmospheric release source applied to the autumn 2017 ^{106}Ru event" by Joffrey Dumont Le Brazidec et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1129-RC4, 2021

This paper does exactly what it says it will do: source term estimation for an emission of Ruthenium using observations, an atmospheric model, and Bayesian inversion. It excels at explaining the concepts involved, making it especially accessible to someone who has not done this exact type of problem before. However, many corrections are needed to the wording, particularly in section 2, and the organization, particularly in section 3.

Comments:

- In the climate modeling community we would refer to an initial conditions ensemble of the same atmospheric model as a “single-model ensemble” rather than a “multi-model ensemble.”

- Missing “a”

60-63. Comment: I like this concise explanation of how a model, source, observations, and likelihood fit together.

- Suggested “These three sources of uncertainty are explored in an application of source term estimation for the ^{106}Ru release…”

- state of the art of

89-94. Can you rephrase this so that it flows monotonically, i.e. reference section 2 before section 3?

- The math is correct but the wording is not quite right. I think you mean that *r* is a positive coefficient and R (and *r*I) is a positive diagonal matrix; *r* itself is not a “positive diagonal coefficient.”

- Of the problem

111-112. Suggest something like…*choosing Gaussian likelihood penalizes the largest errors to an extent that smaller errors are negligible.*

- Rephrase. Consecutive sentences starting with "in other words."

- I think you should delete the sentence starting with ``Every " as the wording is confusing. Your example (100,120) vs (10,12) has already made this point.

- Bracket typo.

- What do you mean by mitigated here? I think you can say "should be 1" or "should be close to 1."

- Missing a word here, which obscures the meaning of the sentence.

- It may be helpful for the reader if you reference the section in which the threshold is discussed.

- If the observation sorting algorithm is the division into r and r_{nd}, then you should not start a new paragraph for sentence 191.

268, 274. "22nd"

- This summary section should be clarified if possible. For uniformity, I recommend starting each bullet point with a section number, e.g.

- Section 3.3.2 is an application of the observation sorting algorithm…;
- Section 3.3.3 is an application of the different likelihood functions and spatial clustering …;
- Section 3.3.4 is an application of the perturbed dispersion parameters and enhanced ensemble…

Secondly, the section heading "Summary" section seems out of place, especially since you have a summary section later. I would suggest renaming 3.3 "Results" and renaming 3.3.1 "Overview."

- “Probable sources”

- “which is not justifiable.”

- Explain when and where this accident took place, and maybe ad some thoughts about how this might compare to what you just did.

436-440. I think more discussion would be helpful for the reader. Remember, many readers skim the paper until they get to the conclusions.