

Review of Sellitto et al.

General comments:

I think this paper is suitable for publication in AMT – it deals with a topic of current interest in the Earth Observation community, namely, observing system simulation experiments (OSSEs) to assess the added value of new observation types. In this case, the OSSEs concern lower tropospheric ozone observations, and the impact of approximations to the OSSE methodology. I recommend the paper be accepted for AMT once the authors address the following points, which mainly concern clarification and quantification of statements made, and technical comments.

Specific comments:

P. 2415, L. 14: What do you mean by “peculiar”? Do you mean unusual? And, if so, what is unusual about this event?

P. 2416, L. 9: Lahoz et al. (2007) do recommend to ESA the use of OSSEs, but do not discuss OSSEs for NWP. Relatively recent OSSEs for meteorological parameters, such as winds, include: Lahoz et al. (2005) and Tan et al. (2007). They could be mentioned here instead of Lahoz et al. (2007).

P. 2417, L. 1: Another model besides a CTM could be used.

P. 2417, L. 27: Which parameter? Thermal contrast?

P. 2418, L. 1: Please expand on what you mean by limited scene-dependence?

P. 2419, L. 18: Carbon monoxide is often used for identifying long-range transport of pollutants.

P. 2419, L. 21: MAGEAQ, although receiving favourable comments, was not selected for EE-8.

P. 2421, L. 25: As far as I can tell, Natraj et al. (2011) discuss OSSEs but do not perform them. I suggest you remove this reference and retain Zoogman et al.

P. 2422, L. 21: Could you quantify the expression “qualitatively similar”?

P. 2425, L. 10: Is the correlation really negative and large in magnitude?

P. 2426, L. 10: An example of what?

P. 2428, L. 19: In Eq. (3) what is “Ig”?

P. 2430, L. 12+: Are these differences significant?

P. 2431, L. 27+: If I read this correctly, you are saying that the results from the approximation are better than for the full RT. Is this correct? If not, please reword.

P. 2448, Fig. 11: Are the differences plotted significant? Have you discussed this in the text?

Technical comments:

P. 2415, L. 14: I suggest you use “spatio-temporal” here and elsewhere.

P. 2416, L. 4: “The construction of an observing...”

P. 2416, L. 14: use “elements”.

P. 2416, L. 15: “...simulator; and the assimilation...”.

P. 2417, L. 25: “...using a look-up...”.

P. 2419, L. 16: Remove “Indeed”.

P. 2419, L. 20: “MAGEAQ was a candidate...”.

P. 2420, L. 3: “..and a field of regard...”.

P. 2420, L. 16: “...we use the...”.

P. 2421, L. 5: I think it would be better to write: “Following Rodgers (2000)...”:

P. 2421, L. 17: I suggest here and elsewhere you remove “pseudo-reality” when you write “NR pseudo-reality”, as it repeats what the NR is.

P. 2422, L. 11: “The question addressed by our study...”.

P. 2422, L. 19: Here (and elsewhere) I would replace “affirm” by “say”. But the authors may wish to be use the more forceful term “affirm”.

P. 2422, L. 22: “In Figs. 1...”. Here and elsewhere I think you mean “integrated” instead of “integral”. Please check and correct if necessary.

P. 2423, L. 1: “...of the whole...over Europe, are used...”.

P. 2423, L. 16+: This is a very long paragraph. I suggest you split it into two, perhaps at “Figures 3 and 4...”.

P. 2423, L. 27: “...straightforward to see how...”.

P. 2424, L. 8: “The hypothesis of approximation...”.

P. 2424, L. 10: Remove “Indeed”.

P. 2424, L. 20+: “...is not related to thermal...thus is not...more details are provided in the next...full RT and the approximations...approximations they are about 1.12...”.

- P. 2425, L. 6: "...to see there are large...".
- P. 2425, L. 18: Replace "dramatically" with "very".
- P. 2425, L. 24: Remove "discussion".
- P. 2426, L. 1: "indicates from which...".
- P. 2427, L. 6: "...event of 19-21...".
- P. 2427, L. 10: "...event was used...".
- P. 2428, L. 15: Do you need "concurrent"?
- P. 2428, L. 27: "...that most of the...".
- P. 2429, L. 2+: "...behaviour for the...". Remove "indeed" in L. 4.
- P. 2431, L. 18: "...between Southern France...".
- P. 2432, L. 7: Remove "In fact".
- P. 2438: Fig. 1 caption: "...for 20 August...".
- P. 2440, Fig. 3 caption: Identify the position of each panel, and identify the meaning of red/blue colours, e.g., relatively high/low values of the parameter plotted. Do this for Fig. 5, 6, 8.
- P. 2446, Fig. 9 caption: Identify the meaning of the red/blue colour.
- P. 2447, Fig. 10 caption: Identify the location of each panel, and the characteristics of ROI1, ROI2, ROI3.
- P. 2448, Fig. 11 caption: Identify the location of each panel.

#### References:

- Lahoz, W.A., R. Brugge, D.R. Jackson, S. Migliorini, R. Swinbank, D. Lary and A. Lee, 2005: An Observing System Simulation Experiment to evaluate the scientific merit of wind and ozone measurements from the future SWIFT instrument. QJRMS, 131, 503-523.
- Tan, D. G. H., E. Andersson, M. Fisher and L. Isaksen, 2007: Observing-system impact assessment using a data assimilation ensemble technique: application to the ADM-Aeolus wind profiling mission. QJRMS, 133, 381-390.