

Editor Decision: Reconsider after minor revisions (Editor review) (05 May 2014) by William Lahoz

Comments to the Author:

The authors should address the comments below, which mainly concern that (as I understand it) the OSSE deals with TEMPO-like and IASI-3-like instruments. The authors should also specify if the OSSE is likely to be overoptimistic, for example, in the conclusions.

If the inference above is incorrect, please indicate to me why this is the case.

These comments do indeed mainly concern changing the language of the manuscript from “TEMPO” to “TEMPO-like,” or adding additional qualifiers to “TEMPO.” We have attempted to add clarification that both the TEMPO and LEO instruments in this study represent the best current estimate of future instrument characteristics, as advised.

L. 29: As I understand it, the configuration you use is not quite that of TEMPO. Thus, I think you should say something like: “...a configuration designed to represent the best current estimate of TEMPO...”

Modified to: “...a configuration designed to represent TEMPO...”

L. 42: Please introduce acronym for ppbv.

From reading of previous ACP papers we found that ppbv is not usually defined – presumably it is generally known.

L. 54: As for L. 29, I think you should say something like: “...from a configuration designed to represent the best current estimate of the NASA ...”

So changed.

L. 104: I suggest here you remind the reader that vis stands for visible.

Visible included in the definition of Vis in this sentence: “visible Chappuis (Vis) ozone bands”.

L. 113: For alphabetical discrimination between the same dates, please use the order:

“...Claeyman et al., 2011; Zoogman et al., 2011, 2014...”

So changed.

L. 127: Style point: I suggest you do not start a paragraph with an acronym.

We appreciate the suggestion but we would prefer to retain the active voice for the sentence.

L. 133: Ideally, the second model is independent, but this is not always done. Perhaps rephrase?

Added “preferably”.

L. 138: I think the description of TEMPO should be modified to follow the points above for L. 29, 54.

Added a sentence for clarification: “The LEO and TEMPO instruments in this study represent the best current estimate of future instrument characteristics.”

L. 172-173: This sentence is clumsy – please reword. Also “better” than what?

Sentence reworked/clarified: “GFDL AM3 has a high mean bias but better simulates high-ozone events than GEOS-Chem (Lin et al., 2012b).”

L. 177-178: Please be consistent with points above for, e.g., L. 29, in the description of TEMPO.

Sentence added for clarity: “As the LEO and TEMPO instruments are still in mission planning, assumptions must be made for their final characteristics.”

L. 179-180: I think you should specify that the LEO instrument is not IASI-3, but is representative of it.

Sentence included in manuscript: “These TIR measurements are intended as representative of ozone observations from LEO instruments operational during the TEMPO lifetime.”

L. 185: I think here you mean the TEMPO instrument to be launched, so please indicate this.

Sentence clarified: “TIR has the advantage of providing observations at night that will be complementary to the TEMPO mission.”

L. 198: I think you should specify that the TEMPO and IASI instruments discussed here are those to be launched, not those discussed in the paper.

Sentence clarified: “TEMPO and IASI-3 will both be...”

L. 222: For completeness, you should remind the reader that the TEMPO instrument considered is intended to represent the best current estimate of TEMPO.

This is an important point, statement included in previous sentence: “Natraj et al. (2011) gives the published best estimate of TEMPO ozone sensitivities”

L. 232: If this assumption is likely to make the OSSE over-optimistic, please indicate so here.

It is uncertain whether this assumption causes the OSSE to be over- or under-optimistic, so we would prefer to leave the discussion of it for the conclusion.

L. 271: Although you refer to Zoogman et al. (2011), I suggest you remind the reader why you choose 29%.

Added explanation: “Following Zoogman et al. (2011), we initialize S_a at the beginning of the simulation as a diagonal matrix with *a priori* errors of 29% (quantified by the difference of GEOS-Chem and ozonesonde measurements)...”

L. 282: Use “...Eq. (2)...”.

So changed.

L. 289: Omit space before the full-stop “.”.

Fixed.

L. 394-395: I think you should use "...We provide evidence that suggests that a LEO satellite instrument flying concurrently with TEMPO would provide no...".

Sentence changed to: "Our evidence indicates that a LEO satellite instrument flying concurrently with TEMPO provides no..."

L. 403: I think you should use "...provided by a TEMPO-like instrument over...". Is your OSSE likely to be overoptimistic? If so, mention here.

Qualification of study realism included in previous sentence: "...this study may overestimate the information TEMPO will provide"

L. 419: In Fig. 1 caption please indicate what the ends of the colour range show: red/blue, relatively high/low values.

Added: "Red/blue coloring denotes relatively high/low ozone values respectively."

L. 223, 234, 236, 309, 313, 314, 326, 328, 332, 340, 343, 363: To be consistent, I suggest using "TEMPO-like", or something else conveying this meaning.

To clarify the relationship between the simulated TEMPO instrument in our OSSE and the future TEMPO instrument we have added/modified here (now L. 227):

"We generate synthetic geostationary observations from the GFDL AM3 "true" atmosphere by sampling daytime vertical profiles over land in the North American domain with the averaging kernel matrix given in Figure 2. Acknowledging that the actual configuration of TEMPO is still under development, we henceforth refer to these synthetic geostationary observations as TEMPO."

We appreciate the suggestion to add "-like" to our text/captions, etc., but we believe that the similarities between the simulated instruments and the instrument planning are now fully explained and great enough to render such language repetitive and confusing. In our experience such language (e.g. "-like") is not the standard for OSSE studies, all of which contain some implicit uncertainty about the accuracy of the instrument simulation. (Applies to all below comments).

L. 227, 313: To be consistent, I suggest using "IASI-3-like", or something else conveying this meaning.

L. 315: I think you should use "...the TEMPO-like instrument for...".

L. 344: I think you should use "The planned TEMPO instrument will provide...".

L. 361, 366, 368, 369: "...from the TEMPO-like instrument...".

L. 377: I think you should use "...of data from a TEMPO-like instrument using...".

L. 389-390: I think you should use "...that the TEMPO-like geostationary...".

L. 423: "...to a TEMPO-like instrument, while...".

L. 442, 458: "...TEMPO-like observations...".

L. 447, 455: "...TEMPO-like...". Heading for Fig. 5 should have "TEMPO-like".

L. 458: Inset for Fig. 6 should have "TEMPO-like".

L. 469: "...TEMPO-like...". Heading for Fig. 7 should have "TEMPO-like".