

Interactive comment on “Potential sources of a priori ozone profiles for TEMPO tropospheric ozone retrievals” by Matthew S. Johnson et al.

Anonymous Referee #1

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The article delivers on its goal of evaluating potential sources of a priori ozone profile information for use in retrievals from TEMPO measurements over North America. The accomplishment is well-summarized by the first sentence of the last paragraph: "This study is a first step in determining what source of a priori vertical O₃ profiles should be applied to best enhance the ability of TEMPO to retrieve tropospheric and LMT column O₃ in North America."

The retrievals envisioned in the article fall into the best-estimate-for-today category of retrieval approaches. That is, they seek to bring in as much information from climatologies or models or other sources as they can into the final near-real-time product. Such approaches may not be well-suited for climate change studies as it can become difficult to unravel the sources of any trends from the influences of the measurements

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versus the influence of the varying a priori profiles. Even with the averaging kernels and a priori profiles provided for each retrieval, assimilation applications of the data will be more complicated too. Do the developers envision that the models will use these retrievals as input to influence the forecasts?

A key performance index for the study is the ability of the retrieved profiles to identify high ozone levels in the lowermost troposphere (LMT 0-2km). With this in mind, Tables 4 and 5 should give correlations so that the readers can better compare the performance of the a priori profiles alone, provided in the earlier tables, to the performance of the retrieved profiles.

I was surprised that the article does not include a discussion of the effects of surface reflectivity (and knowledge of the surface reflectivity and surface pressure) on the lower layer information content. What ground reflectivity was assumed in the clear sky retrievals? How will seasonal variability, especially snow cover, be addressed in the algorithm? A future study could also consider the use of clear versus cloudy or partially cloudy (with cloud height and cloud fraction information from the measurements) results for adjacent pixels to try to identify the below cloud columns better (or even to apply some version of cloud slicing).

Editorial erratum

Table 3 does not contain a listed section for JPL TMF results.

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