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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Analyzing trace gas filaments in the Ex-UTLS by 4D-variational assimilation of airborne tomographic retrievals" *by* Annika Vogel et al.

Anonymous Referee #1

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Review of Vogel et al.

The authors discuss the use of GLORIA ozone measurements to study the extra-tropical UTLS (ex-UTLS), in particular fine-scale features such as filaments. The authors make a good case for the need to identify these fine-scale features and the difficulties of doing so from satellite measurements. The authors thus provide a good motivation for the use of data assimilation to extract this information. The authors use the 4D-Var technique.

However, the results of the paper do not warrant publication in ACP. In my view, the authors demonstrate that there is an impact from using the anisotropic approach in-

stead of the isotropic approach (Fig. 5), but fail to demonstrate whether this impact is beneficial (let alone quantify this impact) by comparison against independent data, the ultimate test of the benefit of data assimilation. This is a significant shortcoming of the paper.

I would recommend the authors extend the work in this paper, following suggestions by this referee and the other referee. This should make the paper suitable for publication in ACP.

The authors need also to address the specific points below (not exhaustive).

Specific comments:

P. 9, L. 29: Where does this negative bias come from? What do you do to address it? The authors should provide this information.

Figure 5: The differences between the isotropic and anisotropic case are small. This suggests an impact from the anisotropic case. However, this does indicate whether this impact is beneficial or not. For this, one must compare the results from the assimilation with independent data (the other reviewer made this comment too). As I see it, the authors do not do such a comparison.

P. 12, L. 8: It would be helpful if the authors identified the location of these filaments in Fig. 6b.

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