

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## **Comment on acp-2021-527**

Anonymous Referee #2

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Referee comment on "Technical note: Quality assessment of ozone reanalysis products and gap-filling over subarctic Europe for vegetation risk mapping" by Stefanie Falk et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-527-RC2>, 2021

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### **general comments**

This study looks at a way to fill in gaps in ground ozone data, principally in the subarctic zone. It uses the example of several data stations, some that stopped measuring in the 1990s, one that was resurrected for 2018/2019 and 2 that are still measuring at present. It presents 3 different reanalysis products that could be used for gap filling, finally settling for CAMSRAQ. It shows the statistical analysis for assessing closeness to the seasonal cycle and being able to fill the gaps in measurement data.

I definitely recommend it for publication with only minor changes.

### **specific comments**

This paper is easy to follow and well written with a very thorough introduction and a good justification for why this analysis is appropriate to Northern Fennoscandia. It does not go as far as recommending how it could be used in other global regions, but justifies that this analysis is particularly applicable to these remote areas with large seasonal variations.

For those unfamiliar with reanalysis products, we assume that these 3 products are the only ones available, 2 global and 1 regional. Maybe the range of other products could be introduced and justify why these 3 were chosen.

The word Biome in the title is never used again, maybe just ozone risk products is needed? Or vegetation ozone risk products?

There seemed to be no explanation of how missing data during a forest fire period may be harder to fill than during a more normal period. Maybe this technique needs to be applied when something serious like a forest fire impedes entry to the station and data is lost.

The analysis of the seasonality is interesting in itself- showing how it is still hard to model and predict.

Figure 6 is the final and most important figure. It should be put before the conclusions, otherwise it may be missed! On line 278, you state that your devised method performs better (78% accuracy) than CAMSRAQ at nearest neighbour. This is very important and is stated in the abstract too but you could compare it to the other methods too. How much better is it?

### **technical corrections**

Line 19 - O3 "acts" as a potent greenhouse gas

Line 92 "data taking" and line 272 "data taking" should be replaced by "Measurements"

Figure 3- The generalized ozone climatology shown as "a" gray band represents----- On average, all reanalysis products "underestimate" [O3].

Line 172- Tromsø "where" [O3]

Line 188 - larger negative deviation from "observations" in DJF and MAM. This indicates that CAMSRAQ might have different issues depending on the region of interest. "Different issues or different uncertainties- maybe this could be elaborated?"

Conclusions Line 248

You say "We confirm that a high spatial and temporal resolution, state-of-the-art mechanistic removal processes (land-atmosphere-ocean), and assimilation of in situ observations at ground-level are a must to constrain reanalysis products," but have you really confirmed it or explained that the land-atmosphere-ocean interaction is applied

here?

Line 263 – “updates may “also” play a role”