

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2022-95-RC2>, 2022
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Comment on acp-2022-95

Anonymous Referee #2

Referee comment on "Lessons from airborne VOC measurements during PAMARCMIP 2018 concerning aged biogenic emissions and ozone depletion events" by Rupert Holzinger et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-95-RC2>, 2022

Review of Possible controls on Arctic clouds by natural aerosols from long-range transport of biogenic emissions and ozone depletion events by Rupert Holzinger et al.

My recommendation for this paper is that it is rejected from ACP and recommend that the data that is the basis for this paper is published in ESSD (<https://essd.copernicus.org>) in order for scientific analysis of the data to be completed in the future. The air trajectory analysis could be included in the ESSD publication including the data output files from running LAGRANTO. If this is done, the scientific analysis can be completed and extended to eventually result in a publication in ACP including scientific conclusions that are supported by a clear and logical analysis of the observations. This paper is not at present a scientific analysis with conclusions that make sense, therefore it should not be published in ACP.

The reasoning for this recommendation is outlined below:

- The hypotheses presented in the paper are not supported by the data and plots included. For example, there is no demonstrated link between clouds, the biogenic emissions, natural aerosols, and ozone depletion events as suggested by the title. This is acknowledged in the title with the word "possible". The information presented in the paper does not suggest even possible controls, as noted by reviewer 1.
- There is no data availability section. This means that the only information that can be concluded from the paper is from the very poor presentation of the data in the plots and tables provided. From the figures and tables alone, I find it nearly impossible to follow the arguments presented. For example, the trajectory analysis is impossible to read on the plots. Most of the plots are time series of the PTR-MS data of specific chemical compounds for each flight. The data should be provided in a public repository or as a publication in ESSD and the authors should complete a more thorough scientific analysis prior to re-submission to ACP.
- Neither the "Introduction" or the "Summary and Conclusions" section provides an

accurate review of what has been done in past work or an analysis of what scientific conclusions are new that are presented in this study. What I see here is that the authors try to mainly show PTR-MS data along with air trajectories. This is an incomplete scientific story and is more adapted for a data publication journal (such as ESSD).

- Each of the sub-sections in the "Results and Discussion" section could be its own scientific paper with an in-depth analysis of the data presented here along with all of the other relevant to atmospheric chemistry collected on the POLAR5 to show: (1) anthropogenic pollution influence on Arctic Haze during March and April 2018; (2) air mass characteristics in pristine air originating from the Arctic surface (sea ice/ocean sources); (3) characteristics of air masses that have biogenic influences (separating marine and terrestrial sources). Each of these papers would require the authors to go much further than what is presented here to make scientific conclusions from the data.

I am sorry to have to provide this review as I agree with the comment from the first reviewer that there is very unique and useful data here. But, collection of the data alone, even if it is very difficult, is not enough for publication in ACP.