Report #1

Submitted on 30 Jul 2021
Anonymous Referee #2

Anonymous during peer-review: Yes No
Anonymous in acknowledgements of published article: Yes No

Recommendation to the editor

1) Scientific significance Does the manuscript represent a substantial contribution to scientific progress within the scope of this journal (substantial new concepts, ideas, methods, or data)?	Outstanding Excellent **Good** Fair Low
2) Scientific quality Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?	Outstanding Excellent **Good** Fair Low
3) Presentation quality Are the scientific results and conclusions presented in a clear, concise, and well structured way (number and quality of figures/tables, appropriate use of English language)?	Outstanding Excellent **Good** Fair Low

For final publication, the manuscript should be
accepted as is
accepted subject to **technical corrections**
accepted subject to minor revisions
reconsidered after **major revisions**
rejected

Were a revised manuscript to be sent for another round of reviews:
I would be willing to review the revised manuscript.
I would not be willing to review the revised manuscript.

Suggestions for revision or reasons for rejection (will be published if the paper is accepted for final publication)
The authors have revised the manuscript significantly by redoing all the analysis following the suggestions given in the reviews. Thus, to my opinion the paper has greatly improved and is now physically sound and ready for publication.

I have only one further remark. In the meantime another publication appeared dealing with the same topic:

Climate impact of aircraft-induced cirrus assessed from satellite observations before and during COVID-19, Quaas et al. 2021, ERL.

stating that

' Here we show, using an analysis of satellite observations for the period March–May 2020, that in the 20% of the Northern Hemisphere mid-latitudes with the largest air traffic reduction, cirrus fraction was reduced by ~9 ± 1.5% ...'

How does that compare to your finding that: '... the cirrus cloud occurrence was reduced by about 17–30% ...'

I recommend to include a comparison between the two studies in your final revised version.

We thank the Referee for the second-round review. To compare our study to the recent published results by Quaas et al. 2021, we note the difference as follows:

1. The difference of detect limit between MODIS and CALIOP: Ackermann et al. (2008) found that 90% of the failed detections occur when the cloud optical depth was less than 0.4; while CALIOP can comprehensively observe the thin cirrus clouds with optical depth from 0.01 to 5 (Winker et al. 2009; Fu et al. Sci. Rep., 2017). So, MODIS is not so good in detecting the very small clouds that actually have the largest changes. In the manuscript, we looked on the reduction of cirrus cloud occurrence depending on the vertical extend and larger changes were found for thinner cirrus (geometrical thickness < 1 km) whereas nearly no changes found for cirrus with large (>2km) vertical extend.
2. Different research area: we concentrated on the European regions covering part of the northern Atlantic flight corridor while they looked at a larger area. A global distribution of cirrus occurrence rate shows that there is a larger cirrus occurrence rate over Europe than the mean values of the northern hemisphere midlatitude (e.g., Sassen et al. JGR 2008).
3. It's mentioned in Quaas et al. 2021 that there is a linear trend (positive in general) in cirrus (fraction and emissivity) over the period 2011-2019. While our study focusing on the reference years 2014-2019 may lead to a larger reduction in 2020 compared with the reference years.
4. In the manuscript, we only looked into March and April data and as we see from the comparison of the two months with quite a large effect. We also compared the results of CALIPSO data in May, showing very little changes, if it's not no changes, in the cirrus occurrence rate and the geometrical thickness.
5. They considered also the dependence on the changes in air traffic (flight track density change), while our study focusing on a region with one of the largest changes (reduced air traffic by >80% in April).

Due to the differences stated above, this might not be comparable one by one. But a short comparison will be stated in the manuscript.

Report #2

Submitted on 09 Aug 2021
Anonymous Referee #1

Anonymous during peer-review: Yes No
Anonymous in acknowledgements of published article: Yes No

Recommendation to the editor

1) Scientific significance Does the manuscript represent a substantial contribution to scientific progress within the scope of this journal (substantial new concepts, ideas, methods, or data)?	Outstanding Excellent **Good** Fair Low
2) Scientific quality Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?	Outstanding Excellent **Good** Fair Low
3) Presentation quality Are the scientific results and conclusions presented in a clear, concise, and well structured way (number and quality of figures/tables, appropriate use of English language)?	Outstanding **Excellent** Good Fair Low

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Were a revised manuscript to be sent for another round of reviews:
I would be willing to review the revised manuscript.
I would not be willing to review the revised manuscript.

Suggestions for revision or reasons for rejection (will be published if the paper is accepted for final publication)
The authors have improved the paper considerably. They have addressed my comments in the previous manuscript, strengthened their arguments and clarified their presentation in many ways. My only objection would be that the authors include very little discussion of any differences in the meteorological conditions over the US and China during 2020 compared to

previous years. Otherwise, I consider the journal article to be a good paper. They have provided good evidence supporting the view that cirrus cloud properties over western Europe changed during the COVID-19 induced air traffic slowdown, and that those changes are caused by the reduction in aviation over Europe during the slowdown.

We thank the Referee for the second-round review and the positive comments. In the manuscript, we focused on the observations over European regions and found that the occurrence rate and thickness of cirrus clouds strongly depended on the meteorological conditions, while this is not the case for the PLDR of cirrus (see the results of April 2016 compared with other years). For the regional comparison, we mainly looked into the cirrus PLDR. The comparison of cirrus geometrical thickness (in occurrence frequency) is to indicate the difference of cirrus properties as well as the different effects of air traffic over China from the other two regions. We may extend the analysis on the regional comparison including meteorological condition comparison in a separate study.