Comment on amt-2021-219

Anonymous Referee #2

Referee comment on "Impact of second-trip echoes for space-borne high-pulse-repetition-frequency nadir-looking W-band cloud radars" by Alessandro Battaglia, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-219-RC2, 2021

The Autor produced a structured and excellent written paper addressing an essential problem for space-borne cloud radars. The 'fake clouds' due to second trip echoes can appear in the CloudSat data. The Autor demonstrated the reasons for the generation of such echoes and how their detection is performed. This is followed by a statistical analysis of CloudSat data to identify the 'fake cloud' appearance in data over the ocean. While the effect in high latitudes is relatively tiny for tropical regions, it can be significant.
This study is in a second step also applied to the future satellite mission EarthCare, which has a higher PRF than CloudSat. Therefore, the probability of second trip echoes and fake clouds in the data set is higher than CloudSat. This work is also based on statistics and forward modeling possible second trip echoes into the CloudSat data, assuming EarthCare settings.
All the results show that for future satellites which are planned to run with a higher PRF, the detection and filtering of such echoes have to be considered. Because for higher PRFs the possible window of such echoes will also move closer to the ground and therefore more into the area of interest.

I only have two minor questions and suggestions:
Could the Autor explain why only CloudSat profiles over the ocean considered for the statistical analysis?
And is it also possible to do such detection and analysis for profiles overland?

I do not have any further questions and would suggest the paper for publication.