Review of "Icing Wind Tunnel Measurements of Supercooled Large Droplets Using the 12 mm Total Water Content Cone of the Nevzorov Probe" by Lucke et al.

Overview

This study is focused on characterizing the performance of the 8mm and 12mm Nevzorov TWC cone sensors in Appendix C and Appendix O conditions. The measurements were performed across three icing wind tunnels, thus enhancing the value of this study. The results obtained in this work are of great importance for the characterization of SLD sprays, which remain one of the challenges in ground based icing test facilities. I did not find any major issues in this study. The paper is well written and it should be accepted for publication after addressing a few minor comments listed below.

Recommendation: The paper should be published in AMT after minor revisions.

Comments

1. One of the problems of microphysical measurements in icing wind tunnels is the spatial non-uniformity of sprays across the test section. This may result in biases of MVD and/or LWC measurements conducted by different instruments if their sampling volumes are positioned at different locations. To mitigate this problem, researchers usually attempt to mount instruments in the same location when conducting comparisons of different instruments or calibrations. The authors briefly mentioned this problem. However, it is not clear what was the of the spatial inhomogeneity of the wind tunnel sprays and what was its effect on the biases of the Nevzorov measurements. Did authors attempted to estimate LWC biases between the LWC, TWC_8 and TWC_{12} Nevzorov sensors due to the sensors spatial separation, by moving the Nevzorov sensor up and down (right and left)? Do you have any estimates of spatial inhomogeneity for each wind tunnel? Such discussion would be beneficial for the paper.

2. It would be relevant indicating that the sensor head employed in this study was designed by the Environment and Climate Change Canada (ECCC) and manufactured by SkyPhysTech Inc. This sensor was tested by ECCC in the NRC AIWT wind tunnel and then used during the In-Cloud ICing and Large-drop Experiment (ICICLE) flight operation for characterisation of icing cloud environment.

3. It appears that the authors refer to the LWC sensor as "Hotwire" throughout the text. In fact, "hotwires" are a class of sensors/instruments used for measurements of condensed water content. However, the term "hotwire" is equally applicable to the 8mm and 12mm cone TWC sensors as well. For that reason, statements, like "…*for the Hotwire and the 8 mm cone*…" sound confusing. It would be reasonable to use conventional names of the hotwire sensors, i.e. "LWC sensor" when applied to a cylindrical hot-wire sensor, and "TWC 8mm (or 12mm) cone" when talking about the TWC 8mm (or 12mm) hotwire cone sensors.

4. Line 178: Korolev at al. (1998a) was focused on studies of the formation of diffraction images of spherical particles in OAPS. However, it did not discuss size corrections of out-of-focus droplet images. This problem was studied in Korolev (2007). Therefore, Korolev at al. (1998a) should be replaced by Korolev (2007). (Korolev, A. 2007: Reconstruction of the Sizes of

Spherical Particles from Their Shadow Images. Part I: Theoretical Considerations. *Journal of Atmospheric and Oceanic Technology,* **24**, 376–389. https://doi.org/10.1175/JTECH1980.1)

5. Page 6: It is worth mentioning that the average value L*=2580 J g-1 in Korolev et al. 1998a was obtained for a different set of ranges of temperatures and pressures as compared to this study.

6. It is worth providing a brief geometrical description of the Nevzorov TWC 8mm and 12mm cones, i.e. inverted cones with the apex angle 60deg and the depths of the cones (~7mm and ~10.4mm).

Alexei Korolev