

Interactive comment on “The observation of nitric acid-containing particles in the tropical lower stratosphere” by P. J. Popp et al.

P. J. Popp et al.

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We would like to thank Dr. Hamill for his detailed review of our manuscript. In the following text, the referee's comments are shown in italics followed by our response in plain type.

In section 2 on line 20 of page 10101 the period after the abbreviation "min" should be removed.

Agreed.

In section 2 on lines 24 and 25 of page 10101 we read "...for short a period later..." instead of "...for a short period later..."

Agreed.

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In section 3 on lines 22 and 23 of page 10103 we read "...are only slightly large than..." instead of "...are only slightly larger than..."

Agreed.

In Section 7 on line 15 of page 10109 we read, "....process is likely further..." instead of "...process is likely to further..."

Agreed.

A few more substantive criticisms now follow. Page 10100 line 7 we read, "By induction, in situ observations can be used..." I do not know why the words "By induction" are in this sentence. I suggest they be removed.

Agreed.

At bottom of same page (around lines 25 or so) various differences between PSCs and tropical NAT particles are listed. Another difference that is not listed is the fact that polar particles grow much more rapidly than tropical particles. This is implied in the paper, but it might be worth mentioning at this point.

Agreed. The text has been modified to clearly state this point.

Page 10102 lines 13/14. "Peaks were not observed in this gap (not shown)..." Sentence is confusing. If peaks were not observed, then obviously they are not shown. I thought perhaps the authors meant the gap was not shown, but since it is visible in the figure, I guess they did not mean that either. So I really do not know what the author's mean by the sentence.

Agreed. The sentence has been clarified by removing "(not shown)". Data were collected during this 1-min period, but were used for determining the background signal of the instrument. Mixing ratios cannot be calculated during this period, but HNO₃ particles would be observable in the raw data if they were entering the sampling inlet.

Section 3, page 10102 lines 25/26, "...under observed conditions." Under observed

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conditions of what? Perhaps of HNO₃ concentration? Unclear.

Agreed. The sentence has been modified to read “with observed amounts of HNO₃, sulfate, and water vapor.”

Page 10103 lines 18/19, "Weinstock et al., 1994, Appendix B" The authors mean to refer to both Weinstocks 1994 paper and the second appendix of the present manuscript. However, it sounds like they are referring to an appendix in the paper by Weinstock. I suggest changing to "Weinstock et al., 1994 and Appendix B."

Agreed.

Page 10106. Figure 4 is mentioned here. I just thought I'd say that this is a very nice corroborative figure.

Caption of Figure 2. "...the integrated HNO₃ mixing ratio for an individual particle in ppv.s." I think this should be ppbv because the integration has been over time. Also, in the same caption, it is not clear if the integration is over a single (thin) peak or over the entire 3 seconds during which the HNO₃ ion is monitored. If it is the whole 3 seconds, then the integration would make the particles appear to be significantly larger than they actually are.

The integrated HNO₃ value must be in units of ppbv·s to account for the sampling frequency of the instrument, which is 5 Hz in this case. The peak integration methodology used here is described by Fahey et al. (In situ observations in aircraft exhaust plumes in the lower stratosphere at midlatitudes, J. Geophys. Res., 100(D2), 3065-3074, 1995). The HNO₃ signal is only integrated over the peak, and not the entire 3 s.

Caption of Figure 5. "...using the model of Appendix B." This should read Appendix A.

Agreed.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 10097, 2005.

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