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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Nitric acid in the stratosphere based on Odin observations from 2001 to 2007 – Part 1: A global climatology" *by* J. Urban et al.

Anonymous Referee #1

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The paper report in a climatology for HNO3 built using Odin observations. It is a subject of strong interest particularly for atmospheric chemistry-climate model assessments and validation but also for devising new instruments for measuring atmospheric composition. The material is well presented and the results are properly discussed. We therefore recommend the paper to be published after some revision.

One point we notice is that the authors did not make any attempt to combine the Odin dataset with other existent climatology for HNO3 neither in try to address the discussion on possible trends in HNO3 concentration. Maybe the authors could still do some work along those lines since this would be really useful for the scientific community.

Section 1

In the introduction, the authors could focus the discussion on the objectives of the paper being more descriptive on what exists in terms of climatology/measurements of nitric acid in the literature. Moreover, the authors should better introduce the originality and innovation of their results. In particular:

- (9571, 5-11): "The molecule …Stiller et al., 2005)" is a rather dense sentence. The reader tends to get confused in the content that not really contribute to build along the paper objectives.

- (9571, 20-24). “Stratospheric nitric acid has…. “. Could be valuable here to expand more on why this climatology is interesting; how does it compares with what exists in the literature and why the authors are building another one.

Section 2

The authors could change the subtitles in this section so that they could better represent their content. We would suggest something along the line: 2.1 Measurements and build of an Odin HNO3 climatology 2.2 Global features 2.3 HNO3 characteristics at high latitudes

The authors keep changing units between potential temperature (K), height (km) and pressure (hPa). While it could be useful for specific purposes, it makes the reading of the paper rather difficult. Using consistently the same units in the text and the figures would avoid confusion and make the paper easier to read and understand.

The use of equivalent latitude has been properly justified. However, it is not clear the value of introducing the potential temperature as a scale, which is a derived rather than a measured quantity. In order to improve the clarity of the paper we would recommend the authors to avoid potential temperature.

Specific points:

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Interactive Comment

-(9572, 11-19): In the paragraph 'HNO3 volume mixing ratios...' please better explain the significance of the sentence '...limitations of the spectrometer read-out data rate...' on line 15.

-(9573, 1): On line 1 please define 'Chalmers version-2.0 retrievals'.

-(9574, 5-25): The authors need to match the order of discussion with the order in which the Figure is presented, i.e. present the results in increasing altitude.

-(9575, 3-8): Is the section of the paragraph starting with 'At the middle and low .." a general comment on HNO3 field? If so, it should be written in a different paragraph. If it is not a general comment, the authors should add a short paragraph to summarize the section. In addition, the authors could elaborate on the role of the different oscillations on HNO3 field.

-(6575, 10-28): A lot of information is presented in this paragraph, which makes it hard for the reader to follow. Furthermore, we hardly see the connection of the paragraph with the objectives of the paper. Just as one example the authors mention 'reversed tape-recorder effect' without elaborating.

Section 3

The authors compare Odin climatology with UARS/MLS without a clear discussion on how each one was build. Would the only difference between the two be the time frame? In anyhow, we believe this paper would be improved by adding more detail on the building of the climatology in itself, a discussion that should actually be placed in the previous section.

-(9576, 25): Excellent is not a quantitative term and without a definition of what excellent means in the context it should be avoid in describing measurements. From Figure 4 one can see that the agreement between the datasets for 40-50 deg is not exactly perfect; there are differences. Therefore, it is difficult to understand why the authors used 'excellent'.

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Interactive Comment

-(9577, 21): We guessed that the paragraph describes Figure 5. However, the authors never refer specifically to this figure in the text.

-(9578, 3-4): It is not clear what is the latitude coverage as per the number of measurements used in building the climatology. For example, would high latitudes climatologic values be based on several measurements that span over the entire dataset or would it be based on only few measurements?

-(9578, 23): Once again we notice the word 'excellent'. Please define what excellent means in this context.

Section 4

The authors should emphasize more the value of the work presented in this paper. This section could also include some discussions about future work in the field of HNO3 measurements: what aspects of the HNO3 global distribution are not clear and should be further explored, what are the recommendation in terms of future missions regarding HNO3 measurements,... Another aspect it could mention is if this climatology would be made accessible to the scientific community and how.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9569, 2008.