

Interactive comment on “Comparison of N₂O₅ mixing ratios during NO₃Comp 2007 in SAPHIR” by H. Fuchs et al.

Anonymous Referee #1

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The manuscript “Comparison of N₂O₅ mixing ratios during NO₃Comp 2007 in SAPHIR” by Fuchs et al. is well written and within the scope of AMT. I suggest publication in AMT after considering a few remarks.

After a brief but adequate introduction to the topic of atmospheric NO_x chemistry and the importance of N₂O₅ measurement, a discussion of different measurement techniques follows. Although this comparison is done using a simulation chamber, mentioning also remote measurement techniques (ground based, on planes or satellites) would complete this part of the introduction. The introduction ends with a discussion about the importance of quality assurance and comparisons of methods and instruments which is the main topic of this paper.

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The experimental section clearly describes the participating instruments and the related methods of measuring as well as the simulation chamber SAPHIR. On p. 4938, 5–22, the authors should add manufactures and types of the used standard instrumentation or refer to the related literature (e.g. Bohn et al., 2005). Regarding to the chamber, a discussion of a possible NO_x memory effect by the used FEP film and the NO_x formation potential by the silent discharge ozonizer would be interesting.

The sections Results and Discussion are very detailed but could be more structured according to the types of instruments (RH, photolysis, inorganic and organic aerosols, VOCs) by using sub-chapters. Also figure 1 contains too much information with rather no structure, splitting this figure in parts, representing the different types of experiments, would be very helpful. Also events like e.g. roof opening and VOC addition should be indicated in the figure. A detailed description of the water-vapour experiment is missing (p. 4944, 23). Especially a discussion about adsorption of NO_x species on water films in the chamber and the instruments would be very interesting. The influence of the filter used in the inlets is very interesting but not unexpected. The authors could consider adding a figure plotting the change of accuracy as a function of the filter age for the different types of experiments. In general the statistical analysis of the achieved data is very good and could only be improved by discussing the disturbing effects (e.g. filter age) using those tools.

The conclusions summarize the main results of the comparison and outline the major problems according to the used instruments and methods like inlet transmission efficiency and the presence of aerosols. Giving a general advice for maximum filter age, aerosol particle concentration and relative humidity would increase the outcome of the comparison.

General remarks:

The interaction of atmospheric halogens with nitrogen-oxide species is mentioned within the introduction but their possible interferences with the applied methods is to-

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tally neglected. The authors could add some discussion about possible interferences with halogens according to the used instruments.

The result and discussion sections should be more structured according to the type of experiments.

Adding a detailed discussion on the influence of water-vapour, especially of adsorption of NO_x species on water films in- and outside the instruments would be interesting and helpful.

A statistical analysis and discussion of the effect of aged Teflon filters on the accuracy of the used instruments should be added, because it seems to be one of the main results according to problems with the involved methods and instruments.

Many figures are not readable at black-white prints. Please change data presentation according to this task. Fig. 1 should be split into parts according to types of experiments.

Technical comments:

p. 4930, 10-15: Displaying the reactions as equations and referring to them would be more demonstrative than describing them in the text of the manuscript.

Tab. 1: add the used Teflon filter types (manufactures, quality, material, . . .).

Tab. 2: Clarify the percentage of water – is this relative humidity? Also add ambient temperatures within the simulation chamber.

Fig. 4 (and others) caption: add the type of the experiments (not only the dates)

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 4927, 2012.