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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of NO, NO_y, N_2O, and O_3 during SPURT: implications for transport and chemistry in the lowermost stratosphere" *by* M. I. Hegglin et al.

M. I. Hegglin et al.

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We thank Klaus Pfeilsticker for his comments and suggestions.

Comment 1: Suggests providing NO_y', also called excess NO_y. NO_y' is the difference between measured NO_y and calculated NO_y (NO_y*) by the equation: NO_y*=(N_2O^{trop}-N_2O^{meas})·0.065+$NO_y{}^{trop}$. 0.065 is also called the effective conversion efficiency (ECE).

Reply 1: One major outcome of the study presented here is that the changing air mass origin in the lowermost stratosphere leads to a seasonal cycle in the NO_y to N_2O

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correlation slope (=ECE), which has to be accounted for in the calculation of NO_y'. A calculation of NO_y' with the factor 0.065 is therefore not appropriate for the use in the LMS. The generally low correlation coefficients between NO_y and N_2O during the SPURT measurements, however, introduce a major uncertainty in the calculation of NO_y' which should be investigated in detail. The discussion of NO_y' from the SPURT measurements is therefore beyond the scope of this paper. The topic will be addressed in future studies. For (preliminary) results of NO_y' calculated for the SPURT measurement campaign please refer to Hegglin (2004).

Comment 2: Suggests including the presentation of the NO_x/NO_y ratio.

Reply 2: We included a new Figure (Fig. 8) in the revised manuscript. The discussion of the figure yields further valuable information about possible sources of NO_y in the LMS.

Comment 3: Importance of halogen bearing gases for the calculation of NO_{crit}.

Reply 3: We included the reference of Salawitch et al. (2005) and also of Glasow et al. (2004) latter showing the importance of Br–chemistry also in the upper troposphere. Nevertheless, we did not extend our calculation of NO_{crit} to halogen chemistry since it is intended to be a first approximation of the chemistry in the UT/LMS region.

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