Interactive comment on “Measurements of NO, NO$_y$, N$_2$O, and O$_3$ during SPURT: implications for transport and chemistry in the lowermost stratosphere” by 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$_2$O$_{trop}$-N$_2$O$_{meas}$)$\cdot0.065$+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$_2$O
correlation slope (=ECE), which has to be accounted for in the calculation of NO\textsubscript{y}'. A calculation of NO\textsubscript{y}' with the factor 0.065 is therefore not appropriate for the use in the LMS. The generally low correlation coefficients between NO\textsubscript{y} and N\textsubscript{2}O during the SPURT measurements, however, introduce a major uncertainty in the calculation of NO\textsubscript{y}' which should be investigated in detail. The discussion of NO\textsubscript{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\textsubscript{y}' calculated for the SPURT measurement campaign please refer to Hegglin (2004).

Comment 2: Suggests including the presentation of the NO\textsubscript{x}/NO\textsubscript{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\textsubscript{y} in the LMS.

Comment 3: Importance of halogen bearing gases for the calculation of NO\textsubscript{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\textsubscript{crit} to halogen chemistry since it is intended to be a first approximation of the chemistry in the UT/LMS region.

References


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