

Interactive comment on “Measurements of NO, NO_y, N₂O, and O₃ during SPURT: implications for transport and chemistry in the lowermost stratosphere” by M. I. Hegglin et al.

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The present manuscript describes measurements of reactive nitrogen gases, N₂O and O₃ around the tropopause and lower stratosphere. Conclusion on the seasonality of the cross tropopause transport and the photochemistry of TL/LMS ozone are made. The study is very valuable, however an advertent reader may miss a tighter and concise interpretation of the data (see below).

(1) It is known that the fraction (6.5 per cent) of missing (from the tropospheric background, 320 ppb) N₂O is photochemically converted into stratospheric NO_y. This frac-

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tion is usually labeled $[\text{NOy}^*]$. Since N_2O and NOy are measured within the present study, a reader may thus wonder why the authors do not consider at all the difference of $[\text{NOy}] - [\text{NOy}^*] = [\text{NOy}']$, which could provide some indications on the sources of the extra NOy' c.f. either due to transported from elsewhere or produced in-situ. Adding this information would be much helpful to understand better the potential sources of TL/LMS NOy .

(2) Also the provision a plot of observed and model (if possible modeled) NO_x/NOy ratio would be much instructive to provide more insight into the apparent, and often in literature stated excess NO_x found around the tropopause when compared to NOy in photochemical equilibrium.

(3) Chapter 4.4 provides a quite instructive discussion on the different regimes of ozone production and losses around the tropopause. However, I guess if reactive halogen bearing gases (ClO , BrO would have been added (e.g., Salawitch et al., 2005), Sensitivity of ozone to bromine in the lower stratosphere, *Geophys. Res. Lett.*, 32, L05811, doi:10.1029/2004GL021504), the outcome would look much different.

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