

Interactive comment on “Improvements in the profiles and distributions of nitric acid and nitrogen dioxide with the LIMS version 6 dataset” by E. Remsberg et al.

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Received and published: 12 April 2010

Lines 53-56: The following selected references will be added:

Mlynczak, Mertens, Garcia, and Portmann, A detailed evaluation of the stratospheric heat budget 2. Global radiation balance and diabatic circulations, *J. Geophys. Res.*, 104(D6), 6039-6066, 1999.

Leovy, Sun, Hitchman, Remsberg, Russell, Gordley, Gille, and Lyjak, Transport of ozone in the middle stratosphere: evidence for planetary wave breaking, *J. Atmos. Sci.*, 42, 230-244, 1985.

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Froidevaux, Allen, Berman, and Daughton, The mean ozone profile and its temperature sensitivity in the upper stratosphere and lower mesosphere: an analysis of LIMS observations, *J. Geophys. Res.*, 94(D5), 6389-6417, 1989.

Figure 1 (and all figures): As you presumed, the black regions denote where there are no data; the exception is for NO₂ in Figure 3 near 5 hPa and 50S. Figure 1 will be updated in that region with an extrapolation of the color scale to include the maximum value.

Lines 165-166: The spurious upward extension of the daytime NO₂ distribution of Figure 2b is above the 1 hPa level from 64S to ~70N latitude.

Lines 170-171: We will change them to read “. . . the occurrence of larger values of NO₂ in the upper stratosphere near 50S in Figure 3 than in Figure 2”.

Lines 289-295: We agree that the original text is incorrect and therefore misleading. Table 1 contains the CALCULATED precision versus pressure for HNO₃, based on its random radiometric error and its pointing jitter. The phrase “shown in Figure 4” of line 289 will be deleted. Also, the titles of Tables 1 and 2 will be changed to read “Calculations of precision and accuracy. . .” “Calculated” will also be substituted for “estimates” in lines 324, 328, and 342.

Lines 410-411 will be revised to “. . .less than 0.2 in the upper stratosphere to near 3 hPa except at the winter high latitudes, where the photochemical partitioning of the atmospheric NO_y to HNO₃ and NO₂ is incomplete. In addition, at the top boundary. . .” Also, the explanation for the larger ratios from LIMS versus the model at the lower latitudes near 0.2 hPa is explained at lines 420ff.

Lines 418-419 will be changed to “. . .both the LIMS and model ratios are declining from 10 to about 3 hPa, but then the LIMS ratios become larger than those of the model at the top-most boundary.”

Lines 448-462 and 464-462: We concur with your concerns and will make the following

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changes for the revised manuscript. Figure 7 will be a single panel figure showing only the HNO₃ comparison with the model. Essentially we will retain the top panel of the original Figure 7 and delete the bottom panel. Given the fact that the uncertainty in NO₂ makes the error bar for LIMS HNO₃+NO₂ quite large and because there is no information available on ClONO₂, any comparison of LIMS HNO₃+NO₂ with the model NO_y can only be qualitative at best. We agree that the differences of those quantities between the model and data are not significant. Thus, the comparison only highlights a possible deficiency in the two-dimensional model. Because the main theme of the paper is not about validation of the model, we agree that it is better to delete that discussion. Accordingly, the paragraph describing the bottom panel of original Figure 7 will be deleted.

Figure 9: We prefer to keep the color scale of Figure 9 the same as that of Figure 8, because it provides an additional indication of the amount of NO₂ versus HNO₃ in the northern hemisphere on January 5 at 31 hPa.

Based on your suggestions, we will make technical changes to the final manuscript for lines 71, 138, 141, 192, 340, 472, and 589. The day at line 141 should have been May 16.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 2769, 2010.