

Interactive comment on “GOMOS O₃, NO₂, and NO₃ observations in 2002–2008” by E. Kyrölä et al.

Anonymous Referee #1

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The paper entitled "GOMOS O₃, NO₂, and NO₃ observations in 2002-2008" by Kyrölä et al. describes zonally averaged GOMOS nighttime measurements of O₃, NO₂ and NO₃ during 2002-2008 in a wide latitude (50S-50N) range, covering the stratosphere (NO₂ and NO₃), as well as the mesosphere / lower thermosphere (MLT) in the case of O₃. The temporal evolution of the zonally averaged density profiles is analyzed by means of a multilinear regression including harmonic (annual and semi-annual), QBO, and solar (F10.7) terms. Total columns as function of latitude and time are also provided.

The data presented and discussed in this paper represents a climatological record which despite of the restricted temporal coverage (only 6 years) provides important new information, being unique in the case of NO₃. The presented O₃ climatology in the MLT region will definitely be of high interest for validation of atmospheric models in this altitude range.

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The paper is well written and the analysis method is sound. Results are presented in a clear and concise manner. The discussion of observed temporal and latitudinal variations is comprehensive although responsible atmospheric processes are not always identified. This, however, might be beyond the scope of this work. I have only a few minor comments which should be addressed before publication in ACP.

p 2174 | 15-18: The authors should provide a rationale (or reference) for their choice of median value error.

p 2178 | 9-12: The authors state in the text that Fig. 7 shows the standard deviation of the zonal mean time series, while in the corresponding figure caption the interquartile range relative to the median value is mentioned. In the next sentence it is stated that the variability of the estimated retrieval errors has been subtracted. Do you mean the standard deviation of the retrieval errors (i.e. the average random retrieval error)? Do you subtract this quantity in order to "isolate" the natural variability? Since natural variability and random retrieval errors add quadratically, this subtraction might be misleading. Another possibility would be to highlight areas in the plot showing a variability greater than the random retrieval errors as areas with significant natural variability (without subtracting them).

p 2184 | 20-23 Can you provide a (speculative) explanation for the positive solar NO₂ response at northern latitudes in the upper stratosphere? Might this be related to NO_x polar winter descent?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 2169, 2010.

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