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Supporting Information for

The vertical distribution of ozone in Mars Years 34-35 from ExoMars TGO/NOMAD-UVIS observations

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1. An intercomparison of ozone vertical profiles

Presented here is a comparison in retrieval products between that presented in this study, with that presented in the parallel study from NASA Goddard by Khayat et al (this issue), who also analysed observations from the NOMAD-UVIS instrument during a similar period but compared to different global climate modelling analyses. Both studies use a similar approach to spectral inversion for determining the ozone number density directly, exploiting the strong ozone absorption band within the range of the NOMAD-UVIS instrument. The comparison presented here provides assurance of the robustness of the approach taken by the two studies, which were undertaken independently.

The retrieval data sets are separated into northern and southern hemisphere comparisons, following the convention of Figure 6 of the main paper. Figure S1 shows the comparison of retrievals for the northern hemisphere (top panel pair) and the southern hemisphere (bottom panel pair).

The high altitude enhancement of O_3 in the 40-55 km altitude range is clearly observed in both studies, covering the period from L_S ~340 to 40°. The peak abundance of O_3 in the lower altitudes (<30 km) in the aphelion season is also in good agreement for both studies. The O_3 retrievals for the southern hemisphere in show good agreement in the detection of the high altitude enhancement of O_3 between 40-55 km for the much longer period between L_S ~5-140°. In both northern and southern hemispheres, the overall distribution of O_3 is in good agreement between the two data sets.

The values of the retrievals in this study show a 10% lower bias in the highest altitudes (>60 km) but due to the low number densities of O_3 at these altitudes, the measurements at these altitudes are well within the calculated retrieval errors in each study.

Overall, the comparison of the retrieval results between these two parallel studies evidences the robustness of the data presented here and independent validation of the features observed, and demonstrates the capability of the NOMAD-UVIS instrument to provide high quality observations of the vertical distribution of O_3 in the atmosphere of Mars.

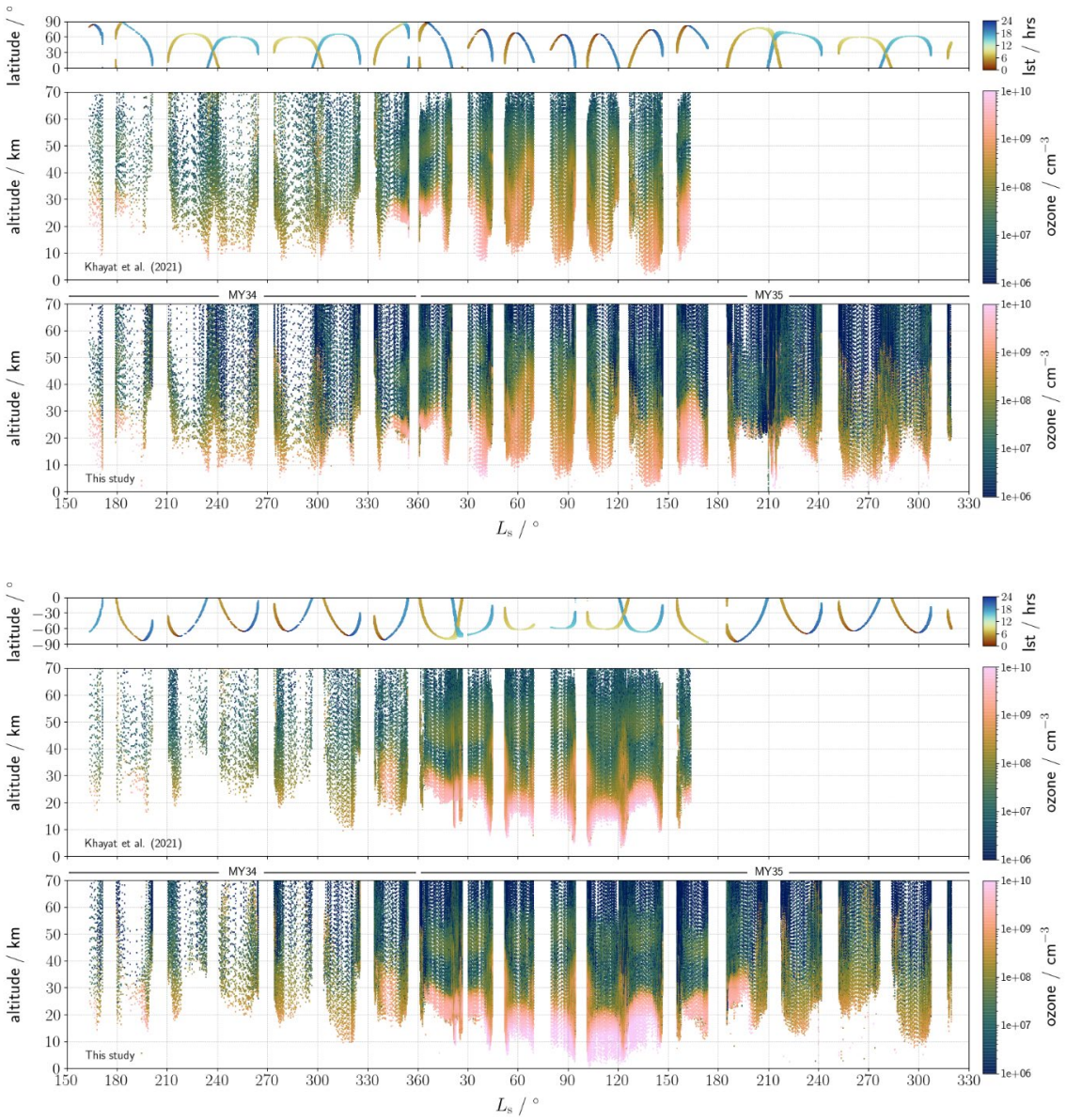

Figure S1. (top) Comparison of northern hemisphere profiles of retrieved O_3 number densities for the Khayat et al. study and this work. (bottom) as above, except for southern hemisphere observations.

References

Khayat, A.S.J, M.D. Smith, M.J. Wolff, F. Daerden, L. Neary, M.R. Patel, A. Piccialli, A.C. Vandaele, I.R. Thomas, B. Ristic, J.P. Mason, Y. Willame, C. Depiesse, G. Bellucci, J.J. López-Moreno, and the NOMAD team. The high-altitude peaks of atmospheric ozone as observed by NOMAD/UVIS onboard the ExoMars Trace Gas Orbiter Mission. *Journal of Geophysical Research- Planets*, this issue.