

***Interactive comment on* “Global nighttime atomic oxygen abundances from resampled GOMOS hydroxyl airglow measurements in the mesopause region” by Qiuyu Chen et al.**

Anonymous Referee #1

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Review on the manuscript “Global nighttime atomic oxygen abundances from resampled GOMOS hydroxyl airglow measurements in the mesopause region” by Chen et al.

The manuscript reported a new dataset of nighttime time atomic oxygen density in the mesopause region derived from the GOMOS instrument on board Envisat. The general features of atomic oxygen can be found, such the peak height and the peak number density etc. The errors, which are introduced by various sources (e.g., chemical reaction rate coefficients, Einstein coefficients, quenching coefficient, atmospheric temperature and other parameters), are analyzed quantitatively. The spatial and tempo-

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ral variations are presented and consistent with previous studies. Finally, the validation is performed by comparing with other independent measurements. A general consistency is obtained among various datasets.

This study provided a new data set of atomic oxygen in the mesopause region. It is very useful in the atmospheric study community.

The paper is well written and may become acceptable for publication. But there are some minor comments noted below, which should to be addressed/incorporated.

Comments

1. Cross comparisons with other data sets are very important. This reviewer found that the O profile of 20-30N, Apr., 2004 in Figure 13 is very consistent with the results of Xu et al., [2012] (see Figure 5). Figures 5 and 6 in Xu et al., [2012] show that the retrieved O profiles at north hemisphere, south hemisphere and equator are very different, which dependent on seasons. How about GOMOS measurements? The comparison and discussions should be added.

Xu, J., H. Gao, A. K. Smith, and Y. Zhu (2012), Using TIMED/SABER nightglow observations to investigate hydroxyl emission mechanisms in the mesopause region, *J. Geophys. Res.*, 117, D02301, doi:10.1029/2011JD016342.

2. P2 L1-2: “although it is difficult to obtain a consistent global picture of absolute density values from these measurements, which differ by a factor of more than 40”
What are values of the absolute density from these measurements? How about the local time and locations of these measurements? 3. P2 L35: “GOMOS”→“GOMOS (Global Ozone Monitoring by Occultation of Stars)”. 4. P9: Do these errors relate to latitudes? 5. P10 L4-6: “migrating diurnal tides, which have a maximum wind amplitude over the equator and two weaker maxima of opposite signs at mid-latitudes.” Which component of wind? Zonal or meridional wind or vertical wind? How about the peak height of the migrating tides in wind? This might be the fundamental for the downward

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and/or upward displacement of [O]. Please clarify the procedure. 6. P10: Equation (1), What is the physical meaning of “Offset”? 7. P12 L6-7: “18%” and “9.6%”, How about the baseline of this percentage?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-417>, 2019.

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