

The authors have included an error estimate for the daily meteoric mass influx. I don't think the method to estimate the error is really robust, but OK.

I have some additional comments that I ask the authors to consider. Some of them are comments that I raised two or three times, but they are still not properly addressed (equation 1, "scaling" of MIF(m) to MIF(s) etc.).

Dear reviewer, we would like to personally thank you for taking the time to review the manuscript carefully. Your careful examination of the text has helped us tie up many loose ends. This work has many unique features such as incorporating data assimilation in the model, no steady assumptions used, MIF value guided by Lidar observations, and comparing MIF values from different data sources. We hope that you will find the text in its current form acceptable for publication. Thank you again for making this work much better presented.

Lines 57/58: There is a recent paper by Joe She that could be cited here:

She, C.-Y., Krueger, D. A., Yan, Z.-A., Yuan, T., & Smith, A. K. (2023). Climatology, long-term trend, and solar response of Na density based on 28 years (1990–2017) of midlatitude mesopause Na lidar observation. *Journal of Geophysical Research: Space Physics*, 128, e2023JA031652. <https://doi.org/10.1029/2023JA031652>

Response:

The suggested paper has been cited.

Equation (1): The units etc. are still not correct. Your response to my last comment was:

Reponse: In our case, the units of x_0 and x_1 are $1/\text{cm}^3$. The units of a_0 and b_0 are $1/\text{cm}^3/\text{second}$.

This cannot be correct, looking the equations. If a_0 and b_0 have the same units, then the second term in the first equation is dimensionless, the first term is not!

Same problem with the second equation. Moreover, the term in the exponential function is not dimensionless. Something is wrong or missing here.

Response:

Thank you for pointing that out. We should have noticed it ourselves. Our apologies for the oversight. The units of the production (a_0) and the loss rate (b_0) are $1/\text{cm}^3/\text{s}$ and $1/\text{s}$, respectively.

We have added the units in the text.

“Where x_0 is the value of the current step. In the simulation, it is the number density of the species. a_0 ($1/\text{cm}^3/\text{s}$) is the production of the species, b_0 ($1/\text{s}$) is the loss rate of the species, Δt is the step size in time, and x_1 is the value of the next step. The units for x_0 , x_1 , and c are $1/\text{cm}^3$.”

Line 171: “all Na(2p)”

Your response to my last comment was:

Response: Na(2p) has been changed to Na(2p) in Table 2 and in the caption.

Sorry, but this is not correct, the "P" should be upper case (as I requested in my last review already). This is textbook nomenclature for excited electronic states.

Response:

The commonly used Notation is $\text{Na}(^2\text{P}_j)$. Please refer to the references below.

Hossain, Md Mosarraf, et al. "Highly varying daytime sodium airglow emissions over an equatorial station: a case study based on the measurements using a grating monochromator." *Earth, Planets and Space* 66 (2014): 1-10.

Plane, John, et al. "On the sodium D line emission in the terrestrial nightglow." *Journal of atmospheric and solar-terrestrial physics* 74 (2012): 181-188.

Plane, John MC, Wuhu Feng, and Erin CM Dawkins. "The mesosphere and metals: Chemistry and changes." *Chemical reviews* 115.10 (2015): 4497-4541.

Bag, T., M. V. Sunil Krishna, and Vir Singh. "Modeling of Na airglow emission and first results on the nocturnal variation at midlatitude." *Journal of Geophysical Research: Space Physics* 120.12 (2015): 10-945.

Koch, Julia, et al. "Comparison of mesospheric sodium profile retrievals from OSIRIS and SCIAMACHY nightglow measurements." *Atmospheric Chemistry and Physics Discussions* 2021 (2021): 1-20.

Line 229: “The seasonal column densities of both ALO and CSU profiles is similar” “is” is not correct

Response:

“is” has been changed to “are”.

Line 313: “The unit of this figure is [1/unit time/cell of equal area].”

Well, if it is „a.u.“ then it's better to write „a.u.“ (arbitrary units)

Response:

Done

Figure 6 and related text: You have to mention that MIF(m) has been scaled or fit to MIF(s). You explained it to me in your last reply, which is of course fine, but the reader also has to know it. Please mention it in the text. Perhaps I overlooked it, but I read the whole paper again and could not find it.

Response:

The sentence ‘MIF(m) is in arbitrary units and has been linearly scaled to match the amplitude of MIF(s).’ has been added to line 348, where Figure 6 is discussed.