

## ***Interactive comment on “The H Lyman- $\alpha$ actinic flux in the middle atmosphere” by T. Reddmann and R. Uhl***

### **Anonymous Referee #1**

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The paper deals specifically with the Lyman-alpha flux in the mesosphere using a Monte Carlo method. The authors have included the effects of the temperature profile and the solar zenith angle in their calculations, and have parameterised their results for use in mesospheric models. The results represent a significant improvement in current parameterisations of the Lyman-alpha flux, and the paper should be published.

There are a couple of scientific points that the authors should clarify. For example, at the top of page two it is mentioned that the natural linewidth is neglected with no justification. This should be either briefly justified or referenced. Farther down page two, the Neumann's rejection method and the Box-Muller method should be either explained or referenced, as the physical basis of the current procedure is unclear. Also, the colour coding on figures 3 through 7 is not distinct. I would suggest that additional figures be use to show the variation with season and the variation in SZA separately.

Finally, there is no mention as to the variation in the thermospheric parameters (e.g. H) that is included in the model, or under what solar conditions the model was run (active or quiet).

Although the paper is generally well written, there are a few sections of awkward language. On page 1, in the first paragraph of the second column of the introduction, the phrase "...which in addition varies..." should be changed to "which varies...". Farther down the introduction, the phrase "As in the mesosphere the optical  $\tau$  is high..." should be changed to "As the optical... is high in the mesosphere". In the third paragraph of section 2.2 the word "exponential" should be "exponentially". Farther down that paragraph, the section beginning "...if the argument of the outer logarithm is positive...escapes from the atmosphere." is unclear. You should list all the possibilities of  $z_{new}$  if the logarithm is positive, and then list the case where it is not positive ( $z_{new} = \infty$ ).

In the conclusion section, the sentence in the first paragraph reading "As the column is the parameter..." is unclear. I would suggest "Thus, the parameterisation of both the temperature profile and the solar zenith effects are based upon the O<sub>2</sub> column." In the next to the last paragraph, the sentence beginning "In addition, the temperature and hydrogen density...", might read better as "In addition, as the temperature and hydrogen density in the thermosphere and exosphere depend on solar activity, so does...". In the final paragraph, the phrase "which is dominantly destroyed by" might be better expressed as "which is destroyed mainly by". Finally, the final sentence "here also the varying..." might read better as "Hence, variations in the O(1D) yield must be considered in photochemical calculations."

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Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1635, 2002.

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