

## ***Interactive comment on “First space-borne measurements of the altitude distribution of mesospheric magnesium species” by M. Scharringhausen et al.***

### **Anonymous Referee #4**

Received and published: 1 October 2007

The paper by Scharringhausen describes observations of mesospheric Mg and Mg<sup>+</sup> made by the SCIAMACHY instrument on the ENVISAT satellite. The authors obtain the first profiles for mesospheric Mg and Mg<sup>+</sup> obtained from satellite observations. The authors describe the observations and in some detail their processes and algorithms for obtaining Mg and Mg<sup>+</sup> profiles from those observations.

The authors describe their retrieval process in great detail. I studied the development of their equations thoroughly. Similar algorithms have been published in the past and there could be some argument that such a level of detail is not required for the present paper. However I feel the authors have done an excellent job of describing the algo-

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rhythms and with the exception of a few minor comments below, I feel it is very worthy for publication. My only concern is that the uncertainties in the data may not warrant such a sophisticated treatment. Figures 25 and 27 suggest that there are only 2 points in each profile where a reasonable number density is truly obtained. Below these altitudes the uncertainties are such that the results do not appear useful. While I think the results should be published, I believe the authors should address the following significant comments and suggestions prior to publication.

1. There is not enough interpretation and analysis of the retrieved altitude profile. The authors need to discuss the large uncertainties and the confidence in the results.
2. A more thorough comparison of the results of Figures 25 and 27 with the models described earlier in the paper should be made. Perhaps the model results should be included in these figures.
3. I suggest showing profiles of the observed emission rates. This would provide the reader with a better feel for the quality of the data.

Minor suggestions:

Abstract, paragraph 4, should read “backscattered light”

In several locations “overview over” should be replaced with “overview of”

Section 1, page 1, 4<sup>th</sup> paragraph, should be ‘At altitudes between 50 and 100 km and higher. . .’

Section 1, last paragraph: not all precipitation particles are trapped within the radiation belts

Section 1.1, first paragraph. It is not clear what is being conveyed here, please clarify.

Section 2, paragraph 1, should be “GOMOS, . . .”

Section 2, paragraph 2, 2380 nm should be 238 nm?

Section 3.1.1, paragraph 1, “get scattered” should be “is scattered”

Section 3.1.2, paragraph 1, “Hartley-Huggens”, please use consistent name throughout

Section 3.1.2, Does  $H=120$  km hold true for all solar zenith angles?

Page 6, last paragraph of first column, “resp.”?

Page 7, paragraph before Equation 39, not all of the air mass factors here are defined.

Page 10, Column 1, last paragraph, “A useful“ should be “Useful”

Section 3.2.4, last paragraph, needs more clarification

Section 3.5, first paragraph, “runs has” should be “runs have”

Page 15, Column 1, last paragraph, “are known to be wrong” should be “are uncertain”

Section 4.1.1, second paragraph, “this disadvantages” should be “these disadvantages”

Section 4.1.1, last sentence, it is claimed that a priori O3 comes from MSIS. This is not possible. Please correct

Section 4.2.1, last paragraph, it is not clear what is being conveyed here, please clarify

Section 4.2.2, second paragraph, “thermospheriuc” should be “thermospheric”

Figures, not clear that all are needed, Figures 14-18 could be removed with the results being described in the text.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4597, 2007.

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