Atmos. Chem. Phys. Discuss., 5, S405–S407, 2005
www.atmos-chem-phys.org/acpd/5/S405/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Alternative polarisation retrieval for SCIAMACHY in the ultraviolet" *by* L. G. Tilstra and P. Stammes

Anonymous Referee #2

Received and published: 11 April 2005

This paper presents and discusses a simple method for the correction of the impact of polarization on the Sciamachy spectra. As it stands, the paper brings no new knowledge on the polarization or on the Earth atmosphere. It does warn the interested community on uncertainties on the current Sciamachy spectra. On the other hand, the method presented in the paper is very specific as it applies only to Sciamachy data. The method may be used in the future for the processing of Sciamachy data, if the science teams chooses to, but a general user has no option but to use the operational method rather than that described in the paper: indeed, additional knowledge on the Sciamachy instrument optical characteristics would be needed if a user would be willing to apply such correction scheme. As a consequence, I feel that the document

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under review is more a technical note to the Sciamachy science team that a paper to be published in a scientific journal open to a wider community.

In addition, the method as it is presented seems to be limited to a very small spectral range. From the description of section 4, I understand that the method permits the correction of polarization between two wavelengths lambda1 and lambda2, at which Sciamachy is insensitive to the polarization. There is no information on lambda1 and lambda2, except that they “are no more than 25 nm apart”. The method is limited to this spectral range as it assumes a linear variation of radiance, and a constant polarization ratio, for this range. There is no discussion on this crucial fact. In fact, the abstract claims that the method is “able to retrieve the full state of polarization in the wavelength range 330 and 400 nm”. This is in contradiction to what is described in the text. Figure 4 indicates that the polarization sensitivity of Sciamachy is quite large for wavelengths close to 400 nm. In addition, at that wavelength, molecular scattering may not dominates as it does for shorter wavelengths so that the approximations may not hold the same way. How does the method applies to this wavelength rang ?

There are several other problems in this manuscript that must be corrected if the editor chooses to publish (which I am opposed to). I give a few of them below.

The introduction gives the conclusion, so that we get 4 times the same information: In the abstract, in the introduction, in the main body of the paper and in the conclusion.

The description of Sciamachy is not needed here, in particular in a special edition on this instrument. Figures 1 and 2 bring very little to the paper.

Equation (6) and a few lines above describe the polarization ratio for wavelengths below 300 nm, while the paper focuses on longer wavelengths.

Below equation 7, it is said that “clouds tend to descrease the degree of polarization, and hence Q and U. This is not true. Clouds tend to increase I, which decreases the polarization ratio. The impact of clouds on Q and U is very variable, and can in fact be

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an increase for longer wavelengths of for specific directions such as that of the rainbow.

There is a strong need for further discussion on lambda1 and lambda2. Do such wavelengths always exist? How do they vary ? In the shorter wavelength range, I see that mu_2 is close to zero while mu_3 stays negative. Thus I suspect there may be configuration with xi such that beta does not take null values.

The discussions on the assumptions of the method is rather poor. In particular, but not only, the fact that the operational processor uses the same approximation does not help much to assess the validity of the method as one objective of the paper is to criticize the operational method results.

I do not see the point of section 5.2 as the corrected measurements are “validated” against a very crude model. The model itself uses adjustable parameters

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 1973, 2005.