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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Averaging kernels for DOAS total-column satellite retrievals" *by* H. J. Eskes and K. F. Boersma

Anonymous Referee #3

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Specific comments:

Abstract, l. 8: the sentence stating Şthis paper generalise the AK concept to the total column retrievalŤ is to my point of view not adequate. This paper is clearly an application of the general Rodgers formalism to a specific case: total column retrieval in optically thin conditions. The relevant part of the abstract should be rephrased accordingly.

Section 3: this section describes in short the principle of the DOAS retrieval. I have two comments: first, mention that the DOAS equation (eq.6) is a direct application of the Beer-Lambert law. Second, concerning the DOAS approximation, there are two main reasons why the retrieval can be simplified in a two-step approach. First the fact that the molecular absorption cross-sections are independent of the pressure and that

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their temperature dependence can be considered as linear. Second, as a reason of the weak optical density of the atmosphere in a large part of the UV-visible, the mean optical path of the scattered photons is weakly dependent on the wavelength so that one single wavelength can be defined for the AMF calculation, that is representative for the whole fitting interval.

In general, since DOAS relies so much on the optically thin approximation, it would be useful to provide some figures that illustrates that this approximation is effectively fulfilled (e.g. give typical NO2 and total optical density at 437 nm, the wavelength used for the calculations shown in Fig.1)

Page 902, l. 23-25: The problem of the temperature dependence of the absorption cross-sections is usually solved in practice (when it cannot be neglected) by using a linear parameterisation. The effective temperature of the measured trace species is then retrieved by the DOAS fit together with its slant column.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 895, 2003.