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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 #1**

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**General Comments:**
This manuscript discusses retrieval theory of UV-visible measurements. It provides a useful link between the language of the DOAS community, and the Rodgers formalism of other satellite communities. It addresses the question of what information should be provided to the user of trace gas columns retrieved from UV-visible measurements.

The DOAS community traditionally includes in their retrieved products a priori information on the vertical profile. This information aids interpretation of the product. A central theme of the present manuscript is to encourage the DOAS community to provide a product that is only weakly dependent on the a priori vertical profile, such as slant columns or vertical columns with little a priori information, and to provide additional information on the instrument vertical sensitivity. This approach removes the need for the DOAS community to provide accurate a priori vertical profile information with their



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products. The recommended approach redefines the retrieved product to reduce error associated with the a priori profile, but limits interpretation of the retrieved product to users with access to a priori information on the trace gas vertical profile.

**Specific Comments:**

There is value in the discussion of what information should be provided by the satellite community, but the philosophical nature of this discussion should probably be presented as such. The present tone of the manuscript implies that the authors have removed the a priori dependence in the retrieval, i.e. the conclusion states that "the use of the AK together with the retrieved column removes the dependence on a priori assumptions". Actually the authors appear to advocate that the responsibility of providing accurate a priori information should be placed upon the user who desires to interpret the retrieved columns.

A few issues arise from a practical standpoint. The AK is dependent upon clouds, aerosols, and surface reflectivity, and needs to be provided for every satellite observation. This will increase the data volume significantly. At what vertical resolution should the AK be provided? A brief discussion of such practical issues would be helpful.

The caption of Figure 1 should include the wavelength at which the calculation was performed.

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