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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

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Response to referee 3

The main point of the comment is to stress the equivalence between providing a combination of vertical columns and averaging kernels, versus providing slant columns and height-dependent air-mass factors.

We agree with this observation, but there are three reasons why we prefer the first combination:
1) A large goup of users will be only interested in vertical columns. This vertical column has a direct meaning (i.e. the best estimate of the actual total column tracer amount in the atmosphere), while the slant column is an optical quantity.
2) The air-mass factor concept is quite specific to DOAS. The formalism developed by Rodgers is much more general and the averaging kernel concept is used in most

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remote sensing discussions. This motivated us to discuss the DOAS approach using the Rodgers language. Kernels are very fundamental: they provide the link between retrieved quantities and reality.
3) Kernels can be provided by retrieval and instrument teams without the direct involvement of 3D chemistry-transport models. The retrieval depends on a detailed knowledge of the instrument aspects, (time-dependent) calibration procedure and knowledge of the radiative transfer, and therefore instrument teams in general are in the best position to perform these retrievals.

These considerations have been incorporated in the updated manuscript.

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