Atmospheric Chemistry and Physics Discussions

Interactive
Comment

Interactive comment on "Piecewise log-normal approximation of size distributionsfor aerosol modelling" *by* K. von Salzen
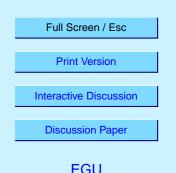
S. Ghan (Referee)

steve.ghan@pnl.gov

Received and published: 14 June 2005

This paper presents a powerful alternative to the conventional log-normal and sectional representations of the aerosol size distributions, combining the strengths of both. The paper demonstrates clearly superior performance of the hybrid method with respect to both speed and accuracy compared to the sectional method. The conclusions are effectively demonstrated through the use of judiciously chosen figures.

However, the paper overlooks previous work on similar hybrid treatments and on advanced sectional representations.

In particular, the paper never mentions Zender et al's (2003) hybrid method. Although

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU

Zender's method predicts only one moment within each section, it does employ truncated log-normal distributions within each section. Given the similarity with the present work, it certainly should at least be mentioned.

A more serious problem is the choice of the sectional treatment that is used for comparison with the hybrid scheme. Although the single-moment sectional scheme is used in some aerosol models, others use two-moment sectional schemes. Comparing a single-moment sectional scheme with a two-moment hybrid scheme puts the sectional scheme at a significant disadvantage. I'd recommend using more advanced sectional schemes such as Tzivion et al. (1987), Russell and Seinfeld (1998), or Jacobson (1997) for comparison with the hybrid scheme. These schemes predict two moments within each section. The first two assume number and mass are linear functions of mass within each section, which is certainly better than assuming uniform mass. I know this will require a significant effort by the author, but am confident it will result in a more convincing evaluation of the merits of the hybrid scheme in comparison with modern sectional schemes.

Minor comment: Negative values of psi are non-physical, implying negative variance. I'd recommend limiting the parameter space shown in Figure 2 to positive values.

Jacobson, M. Z., Development and application of a new air pollution modeling system, II, Aerosol module structure and design, Atmos. Environ., 31, 131-144, 1997.

Russell, L. M. and J. H. Seinfeld, Size- and composition-resolved externally mixed aerosol model, Aerosol Sci. Technol., 28, 403-416, 1998

Tzivion S., G. Feingold, and Z. Levin, An efficient numerical solution to the stochastic collection equation, J. Atmos. Sci., 44, 3139-3149, 1987.

Zender, C. S., H. Bian, and D. Newman (2003a), Mineral Dust Entrainment

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3959, 2005.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU