Atmos. Chem. Phys. Discuss., 9, C1014–C1017, 2009
www.atmos-chem-phys-discuss.net/9/C1014/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Retrieval of atmospheric profiles and cloud properties from IASI spectra using super-channels" *by* X. Liu et al.

Anonymous Referee #1

Received and published: 20 May 2009

General:

The paper presents a new method for the retrieval of atmospheric parameters from IASI spectra by use of EOF decomposition. In general, the retrieval of temperature and water vapour is described well and the presented examples for validation are convincing. However, the simultaneously retrieval of cloud products, first, needs some more explanation and, second, the material presented is not sufficient to allow any judgment on the accuracy of the derived cloud parameters. Further, it is claimed that the method is computationally optimized. To judge on this item a rough comparison of computation time with standard schemes and at least a relative breakdown of the CPU times for various sub-tasks (e.g. forward-modeling, retrieval) would be required.

Specific:

p. 8689, Eq. 2

Could you shortly explain how a_k is determined?

p. 8690, l. 21: Figure 3 . . .

Could you explain in more detail how the error analysis has been done? Which differences are plotted: between PCRTM and the training spectra or an independent dataset? How many spectra have been used to determine the error spectra? Please define the quantities RMS-error and bias-error.

p. 8692, l. 11: Figures 4 and 5 . . .

How have the reflectances and transmittances been calculated? Mie? T-matrix? Which refractive indices have been used? Single particles or particle distribution? Which distribution (width. . .)? What is used for the following retrievals?

p. 8692, Eq. 7

Can you really exclude solar scattering even for the highest wavenumbers?

p. 8693: cloud parameter retrievals

Could you specify which parameters have been retrieved in addition to the cloud parameters?

How has the decision on the cloud type been done by the retrieval model? Performing two retrievals, one for ice and one for liquid water and using the result of the better fit? (This information is missing in the flow diagram of the retrieval process of Fig. 12 and should be added.) How much do the fits in case of liquid water and of ice differ?

p. 8693, l. 24

45 μm seem to be quite large for a liquid cloud. Can you comment on this?

This leads to the following major comment: In contrast to the temperature and H2O-retrieval, the cloud-parameter retrieval is not compared to any external dataset. This

is quite a large drawback of the study and it would be helpful if the authors could at least add some arguments/data to be able to estimate on the reliability of the cloud-connected data products.

p. 8696, Eq. 9

Could you define the matrix U?

p. 8697, l. 7

Could you indicate here if this has been derived from pure simulations or within a retrieval on real data?

p. 8698, l. 7

Could you show by e.g. relaxing the side-conditions that this is not an effect of the retrieval scheme but really due to the a-priori?

p. 8699, l. 27 – p. 8700, l. 5

Skip this paragraph. It does not add any useful information related to the subject of the manuscript.

p. 8701, l. 9 and Tab. 2

Are these all co-incidences between IASI and ARIES? Which co-incidence criterium has been applied?

Technical:

p. 8692, l. 4

size -> sizes

Figs. 2 and 3

x-axis title: should read 'wavenumber (cm^{-1})' y-axis title: missing bracket: (T -> (T)

p. 8697, l. 29

pHa -> hPa

p. 8692, l. 5

Please explain 'ARIES'.

Fig. 12

Inside formula it must read y_m-y_n.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8683, 2009.