Atmospheric Chemistry and Physics Discussions

Interactive Comment

Interactive comment on "Data assimilation of CALIPSO aerosol observations" *by* T. T. Sekiyama et al.

Anonymous Referee #3

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General Comments

The manuscript describes a value application of a 4D-LETKF data assimilation system to CALIPSO aerosol observations. 4D assimilation of aerosol observations is a current research area, which is not very often subject of scientific publications. Especially the assimilation of CALIPSO aerosol observations is a novel topic. The ability of the system to extrapolate information to areas where no observations exist is clearly demonstrated. The described data assimilation system can help to supply initial values to improve aerosol forecasts. I recommend publishing this paper in ACP after taking into account some minor revisions.

Specific Comments

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Interactive Discussion

Discussion Paper

(1) In the introduction the authors mention the essential role of data assimilation in numerical weather predictions. Some references would be useful.

(2) Aside from NWP 4-dimensional data assimilation is used within several chemistry transport models to estimate the state of the gas-phase air pollutants. This should be mentioned.

(3) Page 5787, lines 1-11: Aside from MODIS observations which cannot discriminate the type of aerosols, there is at least one additional type of satellite based aerosol measurement which allow a type discrimination, namely SYNAER observations.

(4) The authors state that the type and size of aerosols have been assimilated without retrieval errors because the 4D-LETKF deals directly with CALIPSO level 1B data. The cloud-aerosol discrimination (CAD) is used to distinguish aerosol particles and cloud droplets. How is the CAD obtained ? Does it contain retrieval errors which contaminate the direct assimilation ?

(5) Page 5792, lines 10-18: The observational operator should be described more detailed.

(6) Page 5793, line 18: It is not described how the model variables are updated due to the assimilation. How is the increment distributed throughout the size bins ?

(7) In Figure 1 the authors do not explain why the data assimilation don't reproduce the aerosol layer observed between 20 and 27°N at an altitude of about 1-3 km.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5785, 2009.

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