

Home

Online Library ACP

- ▣ Recent Final Revised Papers
- ▣ [Volumes and Issues](#)
- ▣ Special Issues
- ▣ Library Search
- ▣ Title and Author Search

Online Library ACPD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper

Impact
Factor
4.865

ISI
indexed



▣ [Volumes and Issues](#) ▣ [Contents of Issue 17](#)

Atmos. Chem. Phys., 7, 4699-4708, 2007
www.atmos-chem-phys.net/7/4699/2007/

© Author(s) 2007. This work is licensed under a Creative Commons License.

The influence of cloud top variability from radar measurements on 3-D radiative transfer

F. Richter¹, K. Barfus¹, F. H. Berger^{1,2}, and U. Görndorf²

¹TU Dresden, Faculty of Forest, Geo and Hydro Sciences, Institute of Hydrology and Meteorology, Dresden, Germany

²German Meteorological Service, Lindenberg, Germany

Abstract. In radiative transfer simulations the simplification of cloud top structure by homogeneous assumptions can cause mistakes in comparison to realistic heterogeneous cloud top structures. This paper examines the influence of cloud top heterogeneity on the radiation at the top of the atmosphere. The use of cloud top measurements with a high temporal resolution allows the analysis of small spatial cloud top heterogeneities by using the frozen turbulence assumption for the time – space conversion.

Radiative observations are often based on satellite measurements, whereas small spatial structures are not considered in such treatments. A spectral analysis of the cloud top measurements showed slopes of power spectra between -1.8 and -2.0 , these values are larger than the spectra of $-5/3$ which is often applied to generate cloud field variability. The comparison of 3-D radiative transfer results from cloud fields with homogeneous and heterogeneous tops has been done for a single wavelength of $0.6 \mu\text{m}$. The radiative transfer calculations result in lower albedos for heterogeneous cloud tops. The differences of albedos between heterogeneous and homogeneous cloud top decrease with increasing solar zenith angle. The influence of cloud top variability on radiances is shown. The reflectances for heterogeneous tops are explicitly larger in forward direction, in backward direction lower. The largest difference of the mean reflectances (mean over cloud field) between homogeneous and heterogeneous cloud top is approximately 0.3, which is 30% of illumination.

▣ [Final Revised Paper](#) (PDF, 1812 KB) ▣ [Discussion Paper](#) (ACPD)

Citation: Richter, F., Barfus, K., Berger, F. H., and Görndorf, U.: The influence of cloud top variability from radar measurements on 3-D radiative transfer, Atmos. Chem. Phys., 7, 4699-4708, 2007. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)

Search ACP

Library Search

Author Search

News

- ▣ [Sister Journals AMT & GMD](#)
- ▣ [Financial Support for Authors](#)
- ▣ [Journal Impact Factor](#)
- ▣ [Public Relations & Background Information](#)

Recent Papers

01 | ACPD, 18 Dec 2008: Energetic particle precipitation in ECHAM5/MESSy1 – Part 1: Downward transport of upper atmospheric NO_x produced by low energy electrons

02 | ACP, 18 Dec 2008: Aircraft and ground-based measurements of hydroperoxides during the 2006 MILAGRO field campaign

03 | ACPD, 18 Dec 2008: Integrated water vapor above Ny Ålesund, Spitsbergen: a multisensor intercomparison