

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



▣ [Volumes and Issues](#) ▣ [Contents of Issue 3](#)

Atmos. Chem. Phys., 5, 755-765, 2005
 www.atmos-chem-phys.net/5/755/2005/
 © Author(s) 2005. This work is licensed under a Creative Commons License.

On the importance of cumulus penetration on the microphysical and optical properties of stratocumulus clouds

S. Ghosh¹, S. Osborne², and M. H. Smith¹

¹Institute for Atmospheric Science, School of the Environment, University of Leeds, Leeds, LS2 9JT, UK

²Met Office, Exeter, Devon, EX1 3PB, UK

Abstract. Owing to their extensive spatial coverage, stratocumulus clouds play a crucial role in the radiation budget of the earth. Climate models need an accurate characterisation of stratocumulus in order to provide an accurate forecast. However, remote sensing as well as in-situ observations reveal that on several occasions, cumulus clouds present below the stratocumulus, often have a significant impact on the main stratocumulus microphysical properties. This was observed during the ACE-2 (Aerosol Characterisation Experiment-2) campaign designed to study the impact of polluted continental air on stratocumulus formation. In this paper we used a detailed micro-physical chemical parcel model to quantify the extent of this cumulus-stratocumulus coupling. In addition, we made extensive use of microphysical observations from the C-130 aircraft that was operated during ACE-2. For the ACE-2 case studies considered in this paper, our analysis revealed that the chemical, microphysical and optical characteristics of the main stratocumulus cloud deck had significant contributions from cumulus clouds that often penetrated the stratocumulus deck. The amount of fine mode ionic species, the average droplet number concentrations, the effective radii and the optical depths during the flight A562 (when cumulus clouds interacted with the main stratocumulus) were estimated and model runs that included this effect yielded microphysical and optical properties which compared more favourably with the observations than the runs which did not. This study highlights the importance of including these cumulus effects in stratocumulus related modelling studies.

▣ [Final Revised Paper](#) (PDF, 262 KB) ▣ [Discussion Paper](#) (ACPD)

Citation: Ghosh, S., Osborne, S., and Smith, M. H.: On the importance of cumulus penetration on the microphysical and optical properties of stratocumulus clouds, Atmos. Chem. Phys., 5, 755-765, 2005. ▣ [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 | ACP, 06 Feb 2009:
 The Cloud Condensation Nuclei (CCN) properties of 2-methyltetrols and C3-C6 polyols from osmolality and surface tension measurements

02 | ACP, 06 Feb 2009:
 Airborne measurements of nucleation mode particles II: boreal forest nucleation events

03 | ACP, 06 Feb 2009:
 Coupling aerosol-cloud-radiative processes in the WRF-Chem model: Investigating the radiative