

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 2](#)

Atmos. Chem. Phys., 4, 557-562, 2004
www.atmos-chem-phys.net/4/557/2004/

© Author(s) 2004. This work is licensed under a Creative Commons License.

A new feedback mechanism linking forests, aerosols, and climate

M. Kulmala¹, T. Suni¹, K. E. J. Lehtinen¹, M. Dal Maso¹, M. Boy¹, A. Reissell^{1,2,3}, Ü. Rannik¹, P. Aalto¹, P. Keronen¹, H. Hakola², J. Bäck⁴, T. Hoffmann⁵, T. Vesala¹, and P. Hari⁴

¹University of Helsinki, Department of Physical Sciences, P.O. Box 64, FIN-00014, University of Helsinki, Finland

²Finnish Meteorological Institute, Sahaajankatu 20 E, FIN-00880 Helsinki, Finland

³University of Helsinki, Department of Chemistry, P.O. Box 55, FIN-00014 University of Helsinki, Finland

⁴University of Helsinki, Department of Forest Ecology, P.O. Box 27, FIN-00014, University of Helsinki, Finland

⁵Institute of Spectrochemistry and Applied Spectroscopy, Bunsen-Kirchhoffstr. 11, D-44139 Dortmund, Germany

Abstract. The possible connections between the carbon balance of ecosystems and aerosol-cloud-climate interactions play a significant role in climate change studies. Carbon dioxide is a greenhouse gas, whereas the net effect of atmospheric aerosols is to cool the climate. Here, we investigated the connection between forest-atmosphere carbon exchange and aerosol dynamics in the continental boundary layer by means of multiannual data sets of particle formation and growth rates, of CO₂ fluxes, and of monoterpene concentrations in a Scots pine forest in southern Finland. We suggest a new, interesting link and a potentially important feedback among forest ecosystem functioning, aerosols, and climate: Considering that globally increasing temperatures and CO₂ fertilization are likely to lead to increased photosynthesis and forest growth, an increase in forest biomass would increase emissions of non-methane biogenic volatile organic compounds and thereby enhance organic aerosol production. This feedback mechanism couples the climate effect of CO₂ with that of aerosols in a novel way.

[Final Revised Paper](#) (PDF, 4181 KB) [Discussion Paper](#) (ACPD)

Citation: Kulmala, M., Suni, T., Lehtinen, K. E. J., Dal Maso, M., Boy, M., Reissell, A., Rannik, Ü., Aalto, P., Keronen, P., Hakola, H., Bäck, J., Hoffmann, T., Vesala, T., and Hari, P.: A new feedback mechanism linking forests, aerosols, and climate, Atmos. Chem. Phys., 4, 557-562, 2004. [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, 24 Feb 2009: Global emissions of non-methane hydrocarbons deduced from SCIAMACHY formaldehyde columns through 2003–2006

02 | ACPD, 24 Feb 2009: Impacts of aerosol indirect effect on past and future changes in tropospheric composition

03 | ACPD, 24 Feb 2009: Measurements of particle masses of inorganic salt particles for calibration of cloud condensation nuclei counters