

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 12

Atmos. Chem. Phys., 9, 4053-4076, 2009

www.atmos-chem-phys.net/9/4053/2009/

© Author(s) 2009. This work is distributed under the Creative Commons Attribution 3.0 License.

## Process based inventory of isoprenoid emissions from European forests: model comparisons, current knowledge and uncertainties

T. Keenan<sup>1</sup>, Ü. Niinemets<sup>2</sup>, S. Sabate<sup>1,3</sup>, C. Gracia<sup>1,3</sup>, and J. Peñuelas<sup>1,4</sup>  
<sup>1</sup>CREAF, Autonomous University of Barcelona (UAB), 08193 Barcelona, Spain  
<sup>2</sup>Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Kreutzwaldi 1, Tartu 51014, Estonia  
<sup>3</sup>Department of Ecology, University of Barcelona (UB), 08007 Barcelona, Spain  
<sup>4</sup>Global Ecology Unit CSIC-CEAB-CREAF, CREAF, Edifici C, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

**Abstract.** Large uncertainties exist in our knowledge of regional emissions of non-methane biogenic volatile organic compounds (BVOC). We address these uncertainties through a two-pronged approach by compiling a state of the art database of the emissions potentials for 80 European forest species, and by a model assessment and inter-comparison, both at the local and regional scale, under present and projected future climatic conditions. We coupled three contrasting isoprenoid models with the ecophysiological forest model GOTILWA+ to evaluate leaf and ecosystem isoprenoid emissions, build an emissions inventory for European forests, and to consider model behaviour in present climate and under projected future climate change conditions. Hourly, daily and annual isoprene emissions as simulated by the models were evaluated against flux measurements. The validation highlighted a general model capacity to capture gross fluxes but inefficiencies in capturing short term variability. A regional inventory of isoprenoid emissions for European forests was created using each of the three modelling approaches. The models agreed on an average European emissions budget of 1.03 TgC a<sup>-1</sup> for isoprene and 0.97 TgC a<sup>-1</sup> for monoterpenes for the period 1960–1990, which was dominated by a few species with largest aerial coverage. Species contribution to total emissions depended both on species emission potential and geographical distribution. For projected future climate conditions, however, emissions budgets proved highly model dependent, illustrating the current uncertainty associated with isoprenoid emissions responses to potential future conditions.

These results suggest that current model estimates of isoprenoid emissions concur well, but future estimates are highly uncertain. We conclude that development of reliable models is highly urgent, but for the time being, future BVOC emission scenario estimates should consider results from an ensemble of available emission models.

Final Revised Paper (PDF, 13649 KB) Discussion Paper (ACPD)

Citation: Keenan, T., Niinemets, Ü., Sabate, S., Gracia, C., and Peñuelas, J.: Process based inventory of isoprenoid emissions from European forests: model comparisons, current knowledge and uncertainties, Atmos. Chem.



Search ACP

Library Search

Author Search

News

- New Alert Service available
- Sister Journals AMT & GMD
- Financial Support for Authors
- Journal Impact Factor
- Public Relations & Background Information

Recent Papers

01 | ACPD, 22 Jun 2009: Elevated nitrogen-containing particles observed in Asian dust aerosol samples collected at the marine boundary layer of the Bohai Sea and the Yellow Sea

02 | ACP, 22 Jun 2009: The relationship between aerosol and cloud drop number concentrations in a global aerosol microphysics model

03 | ACPD, 22 Jun 2009: Evaluation of the volatility basis-set approach for the simulation of organic aerosol

