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 4

Atmos. Chem. Phys., 9, 1253-1262, 2009
www.atmos-chem-phys.net/9/1253/2009/

Evaluation of the global oceanic isoprene source and its impacts on marine organic carbon aerosol

S. R. Arnold[1], D. V. Spracklen[1], J. Williams[2], N. Yassaa[2,3], J. Sciare[4], B. Bonsang[4], V. Gros[4], I. Peeken[5], A. C. Lewis[6], S. Alvain[4], and C. Moulin[4]

[1]Institute for Climate and Atmospheric Science, School of Earth and Environment, University of Leeds, Leeds, UK

[2]Max Planck Institute for Chemistry, Mainz, Germany

[3]Now at Faculty of Chemistry, University of Sciences and Technology Houari Boumediene, U.S.T.H.B., Algiers, Algeria

[4]IPSL/LSCE, CEA Saclay, Gif-sur-Yvette, France

[5]Ifm GEOMAR, Kiel, Germany

[6]Department of Chemistry, University of York, York, UK

Abstract. We have combined the first satellite maps of the global distribution of phytoplankton functional type and new measurements of phytoplankton-specific isoprene productivities, with available remote marine isoprene observations and a global model, to evaluate our understanding of the marine isoprene source and its impacts on organic aerosol abundances. Using satellite products to scale up data on phytoplankton-specific isoprene productivity to the global oceans, we infer a mean "bottom-up" oceanic isoprene emission of 0.31±0.08 (1σ) Tg/yr. By minimising the mean bias between the model and isoprene observations in the marine atmosphere remote from the continents, we produce a "top-down" oceanic isoprene source estimate of 1.9 Tg/yr. We suggest our reliance on limited atmospheric isoprene data, difficulties in simulating in-situ isoprene production rates in laboratory phytoplankton cultures, and limited knowledge of isoprene production mechanisms across the broad range of phytoplankton communities in the oceans under different environmental conditions as contributors to this difference between the two estimates. Inclusion of secondary organic aerosol (SOA) production from oceanic isoprene in the model with a 2% yield produces small contributions (0.01–1.4%) to observed organic carbon (OC) aerosol mass at three remote marine sites in the Northern and Southern Hemispheres. Based on these findings we suggest an insignificant role for isoprene in modulating remote marine aerosol abundances, giving further support to a recently postulated primary OC source in the remote marine atmosphere.

Final Revised Paper (PDF, 638 KB) | Discussion Paper (ACPD)

Citation: Arnold, S. R., Spracklen, D. V., Williams, J., Yassaa, N., Sciare, J., Bonsang, B., Gros, V., Peeken, I., Lewis, A. C., Alvain, S., and Moulin, C.: Evaluation of the global oceanic isoprene source and its impacts on marine organic carbon aerosol, Atmos. Chem. Phys., 9, 1253-1262, 2009. Bibtex | EndNote | Reference Manager