

## Biogenic Secondary Organic Aerosols: Observations to Global Modeling

A workshop series for early career scientists from the US and Nordic countries



Figure 1: Kuivajärvi Lake, Hyytiälä, Finland



Figure 2: BSOA workshop participants, Hyytiälä, 2007

Globally, secondary organic aerosols (SOA) from biogenic precursors (BSOA) surpasses those from anthropogenic precursors. These organic particles have important impacts on air quality and climate, the latter through their direct interactions with radiation, and by the modulation of cloud properties (see Figure 3 for a depiction of BSOA formation). These processes exert a substantial influence on the Earth system through links to the terrestrial carbon and water cycles. The challenges that currently confront researchers working in the fields of BSOA formation and BSOA impacts on the Earth system are numerous and multidisciplinary. These challenges motivated the workshop series 'Biogenic Secondary Organic Aerosols: Observations to Global Modeling', attended by a group of 25 early career scientists selected from the US and Nordic countries. Five internationally distinguished researchers were invited to give keynote lectures and generally contribute to scientific and professional development discussions.

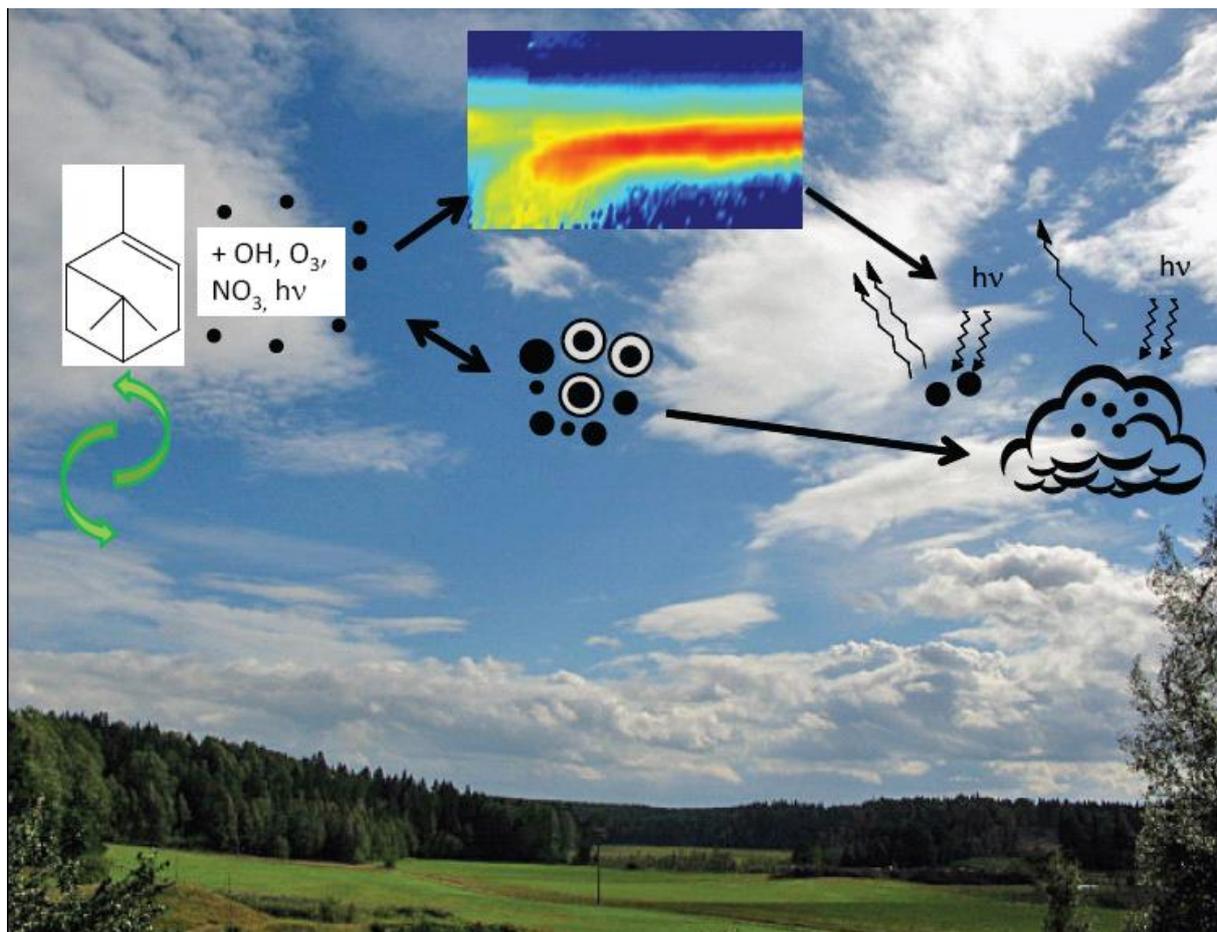


Figure 3: Schematic figure of BSOA formation and impacts in the atmosphere  
(Photo: view from Tovetorp Research Station, Sweden)

The objectives of this workshop series were to:

- 1) establish improved research collaboration between those who perform experiments/field observations and modelers to reduce the uncertainty in predicting the impact of BSOA on atmospheric chemistry and climate
- 2) foster US/Nordic collaboration in these important research areas, especially among early career scientists, and
- 3) provide mentoring and opportunities to discuss scientific career development.

US and Nordic scientists are at the forefront of BSOA research. In Nordic countries extensive modeling and experimental work has evolved from the study of the European boreal forests which have been shown to be substantial source of both aerosol mass and number. Much of this work was done at the Hyytiälä Forestry Field Station in Finland which hosts the SMEAR II (Station for Measuring forest Ecosystem-Atmosphere Relations) site. This was therefore an excellent location for the first workshop meeting in July 2007. Keynote lectures were given by Neil Donahue (Carnegie Mellon University), Markku Kulmala (University of Helsinki), James Smith (National Center for Atmospheric Research, NCAR) and Spyros Pandis (Carnegie Mellon University & the University of Patras).

This first meeting focused on a broad discussion of BSOA and open research questions. Some of the primary topics discussed include:

- The definition of “biogenic” aerosol, in particular the separation between the chemical formation of the aerosol and the source of the precursor
- The level of understanding associated with the emission of BSOA precursors, including poorly constrained processes and sources, which are necessary for local and large-scale modeling
- The treatment of BSOA formation chemistry in model frameworks, including the representation of complicated mixtures by the lumping of species based on chemical properties
- The relevance of chamber experiments and the value of pursuing complex experiments to represent real emissions (i.e. plants) and real atmospheric conditions
- The levels of uncertainty associated with processes and properties affecting the climate impacts of BSOA.
- The need for more long-term measurements in various environments to:
  1. identify the role of organics in the early stages of new particle formation
  2. quantify the organic aerosol loading

In August 2008, the second meeting was held at Tovetorp Research Station in Sweden. This meeting focused on developing future activities including research collaborations, a summer school for graduate students and a call for further international funding from government agencies (see open letter in this edition of the iLEAPS newsletter). Alex Guenther (NCAR) and Kevin Noone (International Geosphere-Biosphere Programme, IGBP) attended the meeting and gave keynote talks.

During the 2-year period of the workshop series several short-term US-Nordic collaborative projects were developed and implemented, with the goal of pursuing future joint funding opportunities.

This workshop series was supported by the US National Science Foundation (NSF), Nordic Center for Excellence: Biosphere-Aerosol-Cloud-Climate Interactions (BACCI), the University of Helsinki and the University of Stockholm. For more information please go to:  
[www.acd.ucar.edu/Events/Meetings/NorUS-BA](http://www.acd.ucar.edu/Events/Meetings/NorUS-BA)

US Participants: K. Barsanti, S. Chung, J. Fry, A. Carlton, A.G. Hallar, C. Heald, K. Huff Hartz, M. Petters, T. Rosenørn, A. Steiner, A. Sullivan, T. Van Reken, D. Worton

Nordic Participants: T. Anttila, J. Bäck, M. Glasius, C. Hoyle, H. Korhonen, R. Krejci, T. Petäjä, J. Rinne, G. Schurgers, B. Svenningsson, P. Tunved, A. Zardini

Organizers: M. Bilde, M. Boy, A. Ekman, N. Mahowald, J. Smith, C. Wiedinmyer