

Laboratory Studies

- i) General Lab studies
- ii) Ice and Halogens Workshop
- iii) EuroChamp



Health of the discipline

- Laboratory-based studies is one of the three fundamental legs of atmospheric science
 - Driver for innovation
- Laboratory-based studies are an area under “threat”
 - funding body indifference



HitT/AICI/IGAC/SPARC

Ice and halogens: laboratory studies to improve the modelling of field data

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IGAC newsletter Jan 2009

BAS June 2008



ACP - Special Issue

Air Ice Chemical Interactions (AICI)

Editor(s): P. Shepson, B. Sturges, and E. Wolff

An overview of snow photochemistry: evidence, mechanisms and impacts 22 Aug 2007

A. M. Grannas, A. E. Jones, J. Dibb, M. Ammann, C. Anastasio, H. J. Beine, M. Bergin, J. Bottenheim, C. S. Boxe, G. Carver, G. Chen, J. H. Crawford, F. Dominé, M. M. Frey, M. I. Guzmán, D. E. Heard, D. Helmig, M. R. Hoffmann, R. E. Honrath, L. G. Huey, M. Hutterli, H. W. Jacobi, P. Klán, B. Lefer, J. McConnell, J. Plane, R. Sander, J. Savarino, P. B. Shepson, W. R. Simpson, J. R. Sodeau, R. von Glasow, R. Weller, E. W. Wolff, and T. Zhu

Atmos. Chem. Phys., 7, 4329-4373, 2007

[Abstract](#) [Final Revised Paper](#) (PDF, 3679 KB) [Discussion Paper](#) (ACPD)

Halogens and their role in polar boundary-layer ozone depletion 22 Aug 2007

W. R. Simpson, R. von Glasow, K. Riedel, P. Anderson, P. Ariya, J. Bottenheim, J. Burrows, L. J. Carpenter, U. Frieß, M. E. Goodsite, D. Heard, M. Hutterli, H.-W. Jacobi, L. Kaleschke, B. Neff, J. Plane, U. Platt, A. Richter, H. Roscoe, R. Sander, P. Shepson, J. Sodeau, A. Steffen, T. Wagner, and E. Wolff

Atmos. Chem. Phys., 7, 4375-4418, 2007

[Abstract](#) [Final Revised Paper](#) (PDF, 5811 KB) [Supplement](#) (2590 KB) [Discussion Paper](#) (ACPD)

Snow physics as relevant to snow photochemistry 16 Jan 2008

F. Domine, M. Albert, T. Huthwelker, H.-W. Jacobi, A. A. Kokhanovsky, M. Lehning, G. Picard, and W. R. Simpson

Atmos. Chem. Phys., 8, 171-208, 2008

[Abstract](#) [Final Revised Paper](#) (PDF, 2514 KB) [Discussion Paper](#) (ACPD)

A synthesis of atmospheric mercury depletion event chemistry in the atmosphere and snow 12 Mar 2008

A. Steffen, T. Douglas, M. Amyot, P. Ariya, K. Aspö, T. Berg, J. Bottenheim, S. Brooks, F. Cobbett, A. Dastoor, A. Dommergue, R. Ebinghaus, C. Ferrari, K. Gardfeldt, M. E. Goodsite, D. Lean, A. J. Poulain, C. Scherz, H. Skov, J. Sommar, and C. Temme

Atmos. Chem. Phys., 8, 1445-1482, 2008

[Abstract](#) [Final Revised Paper](#) (PDF, 1831 KB) [Discussion Paper](#) (ACPD)

Boundary layer physics over snow and ice 07 Jul 2008

P. S. Anderson and W. D. Neff

Atmos. Chem. Phys., 8, 3563-3582, 2008

[Abstract](#) [Final Revised Paper](#) (PDF, 1579 KB) [Discussion Paper](#) (ACPD) [Corrigendum](#)

Corrigendum to "Boundary layer physics over snow and ice" published in 31 Jul 2008

Atmos. Chem. Phys., 8, 3563-3582, 2008

P. S. Anderson and W. D. Neff

Atmos. Chem. Phys., 8, 4115-4115, 2008

[Abstract](#) [Final Revised Paper](#) (PDF, 289 KB) [Corresponding Article](#)



Overall Workshop

- Surface and bulk properties of ices and clouds
- New experimental approaches to the study of ices and aerosols
- Halogen activation in the atmosphere
- Mercury in the cold
- Kinetics of the cold atmosphere
- Outcomes and challenges



Where next?

- Co-ordinated lab/chamber studies
 - What is the composition of ice?
 - Do impurities sit on the surface?
 - What type of layer do the impurities sit in and how fast do they form?
 - What are the chemical and physical natures of the QLL and QBL?
 - How are 'sea salt' aerosols produced over ice-covered zones?
 - How much recycling of reactive species occurs in the snow and the aerosol?
 - What is the role of condensed-phase photochemistry?



Where next?



- Community-based facility?

Hence we need to invest in a community-based/-accessible cold surfaces reaction chamber of sufficient volume to enable study of a range of surfaces and to simultaneously measure reaction products. This effort is crucial because it is important to relate what is measured in the laboratory to the real outdoor environment and *vice versa*. AICI should act to initiate the coordination of this effort and in due course organize a major conference to publicize the results achieved in this fascinating aspect of Atmospheric Science.



Summary

- There is a international strategic need to highlight situation with respect to laboratory work
- SPARC/IGAC should build on workshop outputs on ice and halogens.





Integration of European Simulation Chambers for Investigating Atmospheric Processes: EUROCHAMP

Integrated Infrastructures in Europe

The ability of Europe's research teams to remain at the forefront of all fields of science and technology depends on their being supported by state-of-the-art infrastructures. Within the Integrated Infrastructure Initiative the EC promotes the development of a fabric of research infrastructures of the highest quality and performance in Europe, and their optimum use on a European scale based on the needs expressed by the research community. The EUROCHAMP consortium was successful in securing funding from this EC 6th framework Research Infrastructures Action and the project was initiated in June 2004. The second-phase of the project (EUROCHAMP-2) is supported by the 7th Framework Programme and will run for four years from May 2009.

EUROCHAMP Consortium

The EUROCHAMP consortium currently consists of 14 European institutes who each possess unique, custom-built chambers for studying atmospheric processes.

These specialist facilities can be operated under a variety of atmospheric conditions and are equipped with a range of instruments for studying topics such as in-cloud processes, photochemical smog formation and indoor air pollution.



Partn er no.	Short name	Installation name	Affiliation	Country
1	BUW	QUAREC	BERGISCHE UNIVERSITAET WUPPERTAL, Wuppertal	Germany
2	FZJ	SAPHIR	FORSCHUNGSZENTRUM JÜLICH GMBH, Jülich	Germany
3	CEAM	EUPHORE	FUNDACION CENTRO DE ESTUDIOS AMBIENTALES DEL MEDITERRANEO, Valencia	Spain
4	UBT	LOTASC	UNIVERSITAET BAYREUTH, Bayreuth	Germany
5	UCC	CRAC	UNIVERSITY COLLEGE CORK, Cork	Ireland
6	CNRS	ICARE-ASC	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, Orléans	France
7	PSI	PSI SCAC	PAUL SCHERRER INSTITUT, Villigen	Swiss
8	FZK	AIDA	FORSCHUNGSZENTRUM KARLSRUHE GMBH, Karlsruhe	Germany
9	LEEDS	HIRAC	UNIVERSITY OF LEEDS, Leeds	UK
10	SP	SP 1m3	SVERIGES TEKNISKA FORSKNING SINSTITUT AB, Boras	Sweden
11	PARIS 12	CESAM	UNIVERSITE PARIS XII - VAL DE MARNE, Paris	France
12	IFT	LEAK / LACIS	LEIBNIZ INSTITUT FÜR TROPOSPHAERENFORSCHUNG e.V., Leipzig	Germany
13	UCPH	UCPH chamber	KØBENHAVNS UNIVERSITET, Copenhagen	Denmark
14	UMAN	MASCAPIT AS	THE UNIVERSITY OF MANCHESTER, Manchester	UK



BUW-QUAREC



PSI-SCAC



UCC-CRAC

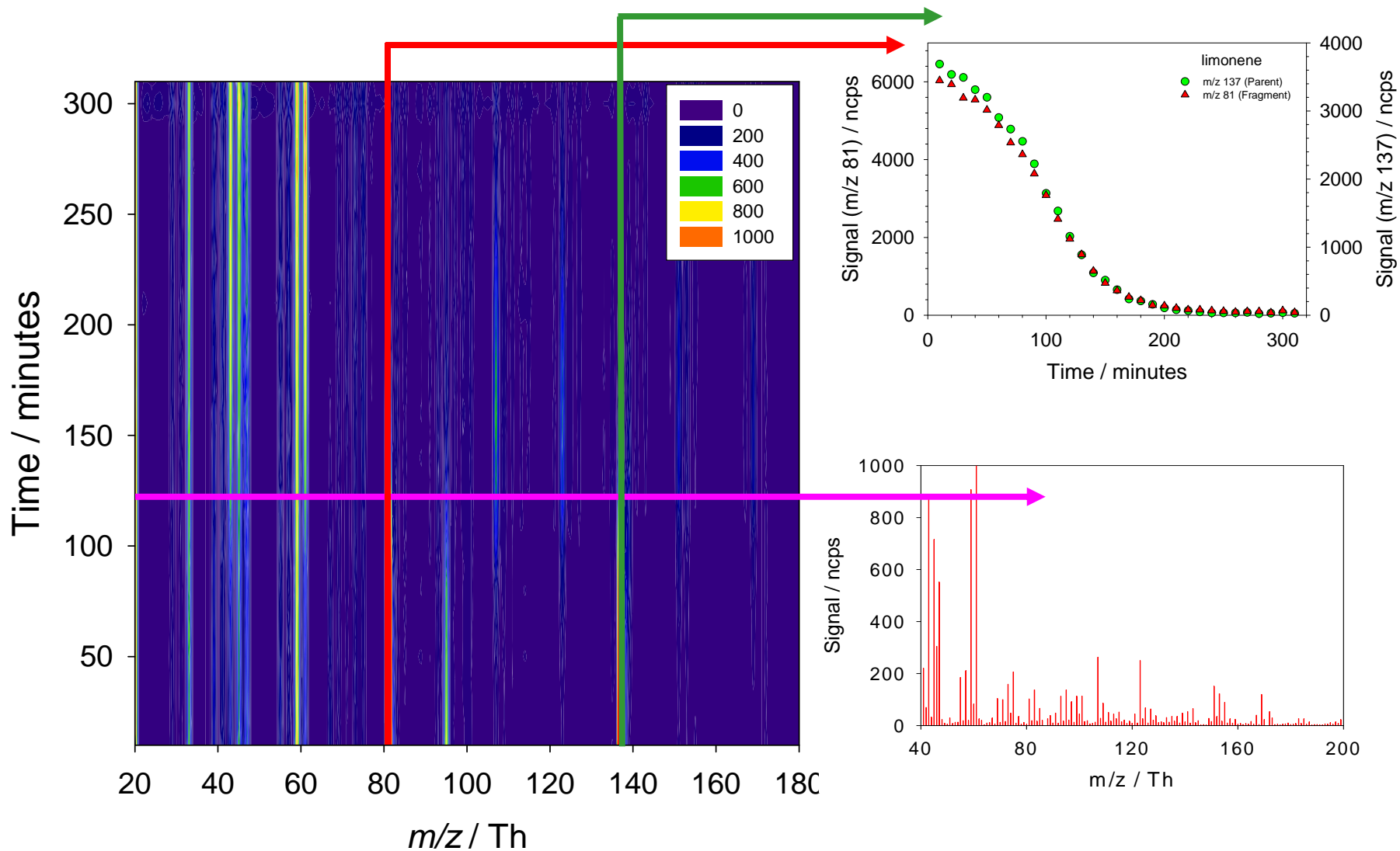


CEAM-EUPHORE



FZJ-SAPHIR

Limonene PTR-TOF-MS in UMAN Chamber



EUROCHAMP Activities

EUROCHAMP:

Duration	01.06.2004 – 31.05.2009
Budget	€3.9 Million
Participants	Initially 11 research facilities from 8 countries. 2 additional partners join in 3 rd year two.

EUROCHAMP-2:

Duration	01.05.2009 – 30.04.2013
Budget	€5.0 Million
Participants	14 research facilities from 8 countries

Networking: All partners contribute to:
(i) development and harmonization of protocols for data analysis; (ii) database construction and management; (iii) instrument inter-comparison exercises; (iv) meetings and workshops; (v) collaboration with related EC projects (e.g. EUSAAR, EUCAARI).

Transnational Access: The chambers are available for use by scientists outside the consortium. Use of the chambers is free and travel and subsistence costs are also provided. Access to the installations is granted on the basis of proposals (continuous call) submitted for review by a panel of international experts. This activity promotes scientific excellence through the mobility of experts and free access to the research infrastructure.

Joint Research Activities: These promote collaboration by working towards the following common research objectives: (i) development of experimental techniques and analytical equipment; (ii) development and evaluation of chemical models used to predict air pollution.

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Achievements

- **Integration** of the existing chambers into a Europe-wide infrastructure that is continuously open to new members/users within EUROCHAMP-2
- **Creation** of the first, large-scale, open database of experimental data from atmospheric simulation chamber studies
- **Fostered** worldwide interdisciplinary collaboration between atmospheric scientists and colleagues from other disciplines (cultural heritage protection and human health)
- **Disseminated** results and other achievements through the EUROCHAMP database, presence at scientific meetings and a constant stream of peer-reviewed publications

Useful Links

- EUROCHAMP homepage:
<http://www.eurochamp.org/>
- European Research infrastructures:
<http://cordis.europa.eu/infrastructures/>
- European Strategy Forum on Research Infrastructures
<http://cordis.europa.eu/esfri/>