



4th Sino-French Joint Workshop on Atmospheric Environment

Changing complexity of air pollution:
sources, chemistry, impacts,
regulations & actions

Programme & Participant list

Lyon - France, December 10th - 13rd, 2014

Organized by:



CNRS-IRCELYON

ILM

CNRS-ICARE

CRAES-MEP

RCEES-CAS

FDU

SDU

Institut de Recherches sur la Catalyse et l'Environnement de Lyon

Institut Lumière Matière

Institut de Combustion, Aérothermique, Réactivité et Environnement

Chinese Research Academy of Environmental Sciences

Research Centre for Eco-Environmental Sciences

Fudan University

Shandong University

Hosted by:

Région Rhône-Alpes



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Changing complexity of air pollution: sources, chemistry, impacts & regulations



Programme

Wednesday, December 10th 2014

19:00: Welcome cocktail and Registration, followed by the welcome dinner at the **Brasserie Georges** 30, Cours de Verdun, 69002 LYON Perrache

Thursday, December 11th 2014

Session chairs: *Jianmin CHEN and Abdelwahid MELLOUKI*

09:00: Opening ceremony and talks

Frédéric GAFFIOT - Director - Higher Education, Research, Innovation and Health and Social Training at Region Rhône Alpes

Catherine PINEL & Michel LACROIX - Directors - IRCELYON - Institut de Recherches sur la Catalyse et l'Environnement de Lyon

Prof. Fahe CHAI - Vice president-Chinese Research Academy of Environmental Sciences

09:30: **Plenary Academician Jiming HAO**

Performance Evaluation on the Action Plan of Air Pollution Prevention and Control and Regional Coordination Mechanism

10:00: **Plenary Prof. Eric VILLENAVE**

Recent developments in atmospheric chemistry in France

10:30: Coffee break + Poster Viewing + group photo

Session chairs: *Barbara D'ANNA and Yujing MU*

11:00: **Plenary Prof. Fahe CHAI**

Comprehensive prevention and control of atmospheric pollution in China

11:30: **Plenary Prof. Dr. Hartmut HERRMANN**

Field measurements and CAPRAM modelling related to tropospheric aerosol and cloud chemistry

12 :10 : **Lunch - Restaurant Selcius**

43 Quai Rambaud, 69002 Lyon Confluence

Session chairs: *Emilie PERREAUDIN and Zhipeng BEI*

14:00: **Keynote Prof. Mindong CHEN**

Optical properties of carbonaceous aerosol and its impact factors in Nanjing, China

14:20: **N. MARCHAND, H. DeWITT, S. HELLEBUST, B. TEMIME-ROUSSEL, L. POLO, A. CHARRON, J-L. BESOMBES, J-L. JAFFREZO, H. WORTHAM**

Direct Measurements of Near-Highway Aerosol Emissions and Volatile Organic Compounds in a High Diesel Environment

14:40: **Dr. Shengrui TONG**

Ambient Condition Effect of Heterogeneous Reaction in the Atmosphere



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- 15:00: A. BIANCO, M. PASSANANTI, L. DEGUILLAUME, G. MAILHOT, M. BRIGANTE
Quantification of hydroxyl radical in cloud aqueous phase and correlation with inorganic photochemical sources.
- 15:20: Prof. Fan MENG
Source Apportionment and Forecasting of the Regional Haze Pollution in China
- 15:40: Coffee break + Poster Viewing
- Session chairs: Mei ZHENG and Philippe VERNOUX
- 16:10: Keynote G. DUFOUR, M. EREMENKO, J. CUESTA, G. FORET, M. BEEKMANN, M. TAKIGAWA, Y. WANG, Z. CAI, Y. LIU, J-M. FLAUD
Springtime variability of tropospheric ozone over Eastern Asia: respective role of cyclones and pollution as determined from space
- 16:30: Keynote Prof. Hong HE
Decline in Environmental Capacity of SO₂ Caused by the Synergistic Effect between NO_x and SO₂
- 16:50: R. HUANG, M. ELSE, Y. ZHANG, C. BOZZETTI, KF HO, JJ CAO, Y. HAN, K. R. DÄLLENBACH, J. G. SLOWIK, S. M. PLATT, F. CANONACO, P. ZOTTER, R. WOLF, S. M. PIEBER, E. A. BRUNS, M. CRIPPA, G. CIARELLI, A. PIAZZALUNGA, M. SCHWIKOWSKI, G. ABASZADE, J. SCHNELLE-KREIS, R. ZIMMERMANN, Z. AN, S. SZIDAT, U. BALTENSPERGER, I. EL HADDAD, A. S. H. PRÉVÔT
Source apportionment of particulate matter using off-line and on-line aerosol mass spectrometry in China
- 17:10: Prof. Xinming WANG
Secondary aerosols from gasoline vehicle exhausts: chamber simulation results
- 17:30: Prof Min HU
Size distribution of submicron aerosols in China
- 17:50: W. CHEN, H. YI, G. WANG, T. Wu, C. COEUR, E. FERTEIN
Lasers and Photonic Applications for Atmospheric Measurements
- 18:10: End of the first day
- 19 :00 : Cocktail at the skyroom - Oxygène Tower
Dinner at the Brasserie des Brotteaux



Friday, December 12th 2014

Session chairs: *Guodong SUI and Patrick RAIROUX*

- 09:00: **Keynote Prof. Xin YANG**
Online hygroscopicity and chemical measurement of urban aerosol in Shanghai, China
- 09:20: **Keynote Prof. Remy SLAMA**
Health effects of air pollution exposure during pregnancy: an epidemiological perspective
- 09:40: **B. GUINOT, L. ROBLOU, C. LIOUSSE, H. XU, Z. ZHAO, X. NIU, J. CAO**
Chemical composition of size-segregated aerosols and estimation of their deposition in the lungs of Middle School children in Xi'an, China
- 10:00: **Prof. Hezhong TIAN**
Temporal Trend and Spatial Distribution Characteristics of Global Emission Inventory of Antimony from Anthropogenic Activities.
- 10:20: **Short Posters Presentations (1 min /1 slide presentation per poster)**
- 11:00: **Coffee break**
- POSTERS VIEWING + DISCUSSIONS**
- 12 :10 : **Lunch - Restaurant Selcius**
43 Quai Rambaud, 69002 Lyon Confluence

Session chairs: *Zhigang XUE and Jean-Luc Jaffrezo*

- 14:00: **Keynote Gilles AYMOZ & Nathalie POISSON**
Research in support for Air Quality management actions
- 14:20: **Dr. Yan DING**
Mobile sources emission control in China
- 14:40: **Q. ZHANG, A. ALBERGEL, C. DEROGNAT, D. BUTY, M. NIBART, S. SOCQUET, B. R. Du BOISSIEU, L. ALLEMAN, S. WU**
An integrated air pollution early-warning system for industrial pollution supervision
- 15:00: **Prof Shuxiao WANG**
Characteristics and formation mechanisms of fine particle pollution in the Yangtze River Delta, China
- 15:20: **Presentations from 3 Sponsors (10 min each)**
Mai ZHAO



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Beijing SPC Environment Protection Tech Co.,Ltd

The exploration in air pollution control by Beijing SPC Company

Jinglei WANG

Hangzhou WMADE Intelligent Technology Co., Ltd

Automatic batch weighing system for PM_{2.5}

Ed Lemon, Rob Proost

Metrohm

Extended applications with MARGA (Monitor for AeRosols and GAses)

15:50: Coffee break + Poster Viewing

Session chairs: *Guoliang SHI and Véronique DAËLE*

16:20: Keynote Prof. Tong ZHU

The panel studies on the health effects of particulate matter in china

16:40: A. BOYNARD, C. CLERBAUX, L. CLARISSE, S. SAFIEDDINE, M. POMMIER, M. VAN DAMME, S. BAUDUIN, C. OUDOT, J. HADJI-LAZARO, D. HURTMANS, P-F COHEUR

First simultaneous space measurements of atmospheric pollutants in the boundary layer from IASI: a case study in the North China Plain

17:00: B. HANOUNE, M. BLOCQUET, S. BATUT, S. COUDERT, S. GERMAIN, D. PETITPREZ, L. PILLIER, M. WARD, M. MENDEZ, S. DUSANTER, V. Gaudion, T. LEONARDIS, N. LOCOGE, M. RIZK, M. VERRIELE, M. GUGLIELMINO, S. LE CALVÉ, C. LIAUD, C. SCHOEEMAECCKER

The Complex Chemistry in Low Energy Buildings

17:20: Prof. Tijian WANG

Study on air pollution and climate interaction using regional model RegCCMS and RegCM-CHEM

17:40: Prof. Jianguo LIU

Tropospheric atmosphere fine particle detection and monitoring techniques

Session chairs: *Jianmin CHEN and Christian GEORGE*

18:00: Conclusions of the meeting

20 :00 : Dinner at the Institute Vatel

58 Rue Franklin, 69002 Lyon

Saturday, December 13th 2014

10:00 - 16:00: Discovery tour in the World heritage Zone of the city of Lyon



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Posters

1. *Typical Air Pollution Sources Emission Characteristics and Emission Inventory Technology in China*
[Zhigang XUE](#)
2. *Using Source Directional Apportionment method to estimate the PM_{2.5} source contributions in city*
[Ying-Ze Tian, Guo-Liang Shi, Jian-Hui Wu, Yin-Chang Feng*](#)
3. *Agricultural straw burning contributing to carbonaceous aerosol mixed with inorganic salts: a chamber simulation study*
[Chunlin Li and Jianmin Chen*](#)
4. *Measurement of oxidative potential of biodiesel DPM and its correlation with the volatile organic component of PM and the chemical compositions of biodiesel fuel*
[S. Stevanovic*, Z.D. Ristovski, A.M. Pourkhesalian, B. Miljevic, M.M. Rahman, A. R. Masri, R. J. Brown](#)
5. *Kinetic and products study of the Gas-Phase Reaction of Lewisite with Ozone under atmospheric conditions*
[Wang Haitao*, Zhang Yuanpeng, Guo Xiaodi, Shao Yusheng, Gao Runli, Liang Dejian& Sun Hao](#)
6. *An approach to investigate new particle formation in the vertical direction on the basis of high time-resolution measurements*
[He Meng, Yujiao Zhu, Greg J. Evans, Xiaohong Yao*](#)
7. *Source apportionment studies in Chinese megacities*
[Xing Peng, Guo-Liang Shi, Yu-Fen Zhang*, Yin-Chang Feng*](#)
8. *Pollution Characteristics and Health Risk Assessment of Atmospheric Volatile Halogenated Hydrocarbon in Northeastern Urban Area of Beijing, China*
[Linghong Xu , Hong Li*, Dongyao Xu, Lei Li Yanting Yu, Xuezhong Wang, Weiqi Zhang, Lingshuo Meng](#)
9. *Observations at Background Air Monitoring Sites in the Qinghai-Tibet Plateau: 011-01*
[Zhipeng Bai*, Wen Yang, Fei Wang, Rufeng Sun, Yan-li Wang, Wenjie Zhang, Wan Wang](#)
10. *Measurement of N₂O₅ and ClNO₂ at urban and rural sites in Hong Kong and China*
[Zhe Wang, Tao Wang*, Tham Yee Jun, Xinfeng Wang, Weihao Wang, Peter K.K. Louie, Connie W.Y. Luk, Wenxing Wang](#)
11. *Seasonal, Diurnal and Nocturnal Variations of BTEX Compounds in the Semi-Urban Environment of Orleans, France*



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Zhaohui Jiang, Abdelwahid Mellouki*, Benoît Grosselin¹, Véronique Daële¹,
Mathieu Cazaunau¹, Yujing Mu

12. *Pollution Status of Ambient Volatile Organic Compounds in China*

Xinmin Zhang, Zhigang Xue, Hong Li*, Fahe Chai, Lei Li, Yuan Yang

13. *Simulation of the Impact of Plants on the Atmospheric Particle Size Distribution of PM₅*

Junqi DING*, Xiaomu XU, Yingying CAO, Xiaoxiu LUN

14. *Preliminary Study on the Distribution Characteristics of LAS (Linear Alkylbenzene Sulphonates) in PM_{2.5} in the Northeastern Urban Area of Beijing during 01 CAREBEIJING-NCP*

Hongjiao LI, Hong LI*, Jilong LU, Yanting YU, Fenmei XIA, Jingying MAO, Zhengzheng ZHANG

15. *Source apportionment studies in Chinese megacities*

Xing Peng, Guo-Liang Shi, Yu-Fen Zhang*, Yin-Chang Feng*

16. *Improved methods for source apportionment in PM₅ in urban areas*

Xiao-Yu Zhou, Guo-Liang Shi*, Xiao-Hui Bi, Yin-Chang Feng

17. *Deposition of water soluble inorganic ions in PM_{2.5} above forestry system in Beijing, China*

YingYing-Cao, XiaoXiu-Lun*, RenNa-Li, FengBin-Sun, XinXiao-Yu

18. *Chemical characterization and source apportionment of PM_{2.5} in urban sites under industrial influences*

Adib Kfouri, Frédéric Ledoux, Cloe Roche, Fabrice Cazier, Dorothée Dewaele, Abdelhalim Limem, Mathieu Puigt, Gilles Delmaire, Gilles Roussel and Dominique Courcot*

19. *Improved methods for source apportionment in PM_{2.5} in urban areas*

Xiao-Yu Zhou, Guo-Liang Shi*, Xiao-Hui Bi, Yin-Chang Feng

20. *Exploring the oxidative damage toxicity of lead in air*

Hao Zhang and Rutao Liu*

21. *Photolysis of nitrous acid (HONO) emitted by burning candle as a source of high levels of hydroxyl radical (OH) indoors*

Sasho Gligorovski*, Vincent Bartolomei, Elena Gomez Alvarez, Julian Wittmer, Rafal Strekowski, Cornelius Zetzsch, Etienne Quivet, Jörg Kleffmann, Henri Wortham

22. *One year of real-time chemical speciation measurements of submicron particulate matter (PM) at a receptor site impacted by industrial emissions in Dunkirk, France*

Shouwen Zhang', Véronique Riffault, Sébastien Dusanter, Patrick Augustin, Marc Fourmentin, Hervé Delbarre



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23. Gaseous and particulate emission of PAHs from soils of Alpine forest: Temperature and soil organic matter dependence

Bernard David, Julie Besse

24. Progress and Prospective of Atmospheric Photochemical Smog Chamber Simulation Study in China

Hong LI, Xuezhong WANG, Weiqi ZHANG, Yujie ZHANG, Fang BI, Fengmei XIA, Hongjiao LI, Lingshuo MENG

25. An Infra-Red Laser High Resolution Spectrometer to Measure Fluxes of greenhouse gases and δC/C of CO from various ecosystems to atmosphere

Christophe Guimbaud, Cécile Noel^{*}, Benoit d'Angelo^{*}, Sébastien Gogo, Michel Chartier, Claude Robert, Fabrice Jégou, Valéry catoire, Jean Christophe Gourry, Fatima Laggoun Défarge, Ioannis Ignatiadis

26. DEVELOPPEMENT OF ON-LINE AND FIELD DUAL TD GC - MS FOR AUTOMATIC VOC MONITORING ON PETROCHEMICAL SITES

Franck AMIET, President and CEO; Michel ROBERT, R&D department Manager, Member of CEN/TC6/WG, Chromatotec Company, Saint Antoine, France

27. Atmospheric reactivity of Chlorpyrifos

EL Masri, H. Laversin, E. Roth, A.Chakir

28. Satellite observation of the D distribution of dust plumes from IASI throughout a major desert dust outbreak across East Asia in March 008

Juan Cuesta, Maxim Eremenko, Cyrille Flamant, Gaëlle Dufour, Benoît Laurent, Gilles Bergametti, Michael Höpfner, Johannes Orphaland Daniel Zhou

29. Polycyclic Aromatic Sulfur Heterocycles (PASHs) in airborne particles: tracing carbon industry?

Benjamin Golly^{*}, Antoine Waked, Olivier Favez, Guillaume Brulfert, Jean-Luc Jaffrezo and Jean-Luc Besombes

30. OH reactivity budget at a receptor site impacted by industrial, urban and marine air masses in Dunkirk, France

Vincent Michoud, Sébastien Dusanter^{*}, Nadine Locoge, Thierry Leonardis, Véronique Riffault, Shouwen Zhang^{*}

31. Fusion of environmental information for the evaluation of ground level air quality using dynamic land-use regression

Lasse Johansson, Ari Karppinen, Katja Loven and Mari Kauhaniemi.

32. Microbial action on cloud oxidant capacity and carbon budget



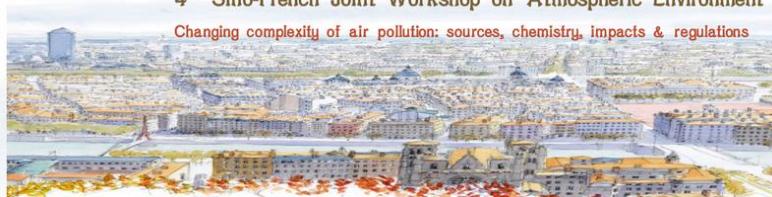
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Changing complexity of air pollution: sources, chemistry, impacts & regulations



Virginie Vinatier, Mickael Vaïtilingom¹, Laurent DEGUILLAUME, Marie CHEIZE, Pierre AMATO, Martine SANCELME Géraldine SARTHOU, Gilles MAILHOT, Anne-Marie DELORT

33. Impact of wood burning in an Alpine valley

Florie Chevrier¹, Griša Močnik, Guillaume Brulfert, Jean-Paul Laurent⁵, Jean-Luc Jaffrezo and Jean-Luc Besombes*

34. A Theoretical Calculation of the Optical Properties of Carbon Nanoparticles Modeling Soot

Carlos Garcia-Fernandez, Sylvain Picaud and Michel Devel

35. Theoretical Study of the Kinetics of the Reaction between -Hydroxy--Methyl--Pentanone with OH radicals

Mano Priya Angappan, Senthilkumar Lakshmi pathi* and Gisèle El Dib

36. Atmospheric fate of hydroxyketones: photolysis and reaction with OH radicals and Cl atoms

Gisèle El Dib*, Chantal Sleiman, Hichem Bouzidi¹, Alberto Moreno, Alexandre Tomas¹, Estelle Roth⁵, Bernabé Ballesteros, André Canosa, José Albaladejo and Abdelkhaleq Chakir⁵

37. Impact of aftertreatment device and driving conditions on black carbon, particle and NO emissions for Euro 5 DPF vehicles

C. LOUIS, Y. LIU, M. GORIAUX, P. TASSEL, P. PERRET

38. Pollution Status of Ambient Volatile Organic Compounds in China

Xinmin Zhang, Zhigang Xue, Hong Li*, Fahe Chai, Lei Li, Yuan Yang

39. Role of bacteria in atmospheric chemistry: determination of biodegradation rates of compounds present in cloud water

Nolwenn Wirgot

40. Laboratory Studies of Multicomponent Aerosol Nucleation with Sulfuric acid, Ammonia and Amines

Shanhu Lee

41. Deployment of the new TAG-AMS instrument with in situ derivatization: case study of an Alpine valley in France.

Amélie Bertrand, Langley DeWitt, Brice Temime-Roussel, Thorsten Hohaus, Donna Sueper, Florie Chevrier, Jean Luc Besombes, Jean Luc Jaffrezo, Griša Močnik, Nathan Kreisberg, Gabriel Isaacman, Susanne Hering, Allen Goldstein, John Jayne, Henri Wortham, Nicolas Marchand



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42. *Pollution Characteristics of Heavy Metals in Different Size Particle Matters in Winter in Zhuzhou City, Hunan Province*

Kai ZHANG, Zilong ZHENG, Fahe CHAI*, Xuecai ZHONG, Xinshu KE, Qing YANG

43. *Volatile Organic Compounds (VOCs) sources in Paris : near-field / ambient air measurements and comparison with the local emission inventory*

Alexia Baudic, Valérie Gros, Stéphane Sauvage, Nadine Locoge, Olivier Perrussel, Nicolas Marchand, Irène Xueref-Rémy, Lamia Ammoura, Roland Sarda-Estève, Cerise Kalogridis, Nicolas Bonnaire, Dominique Baisnée, Bernard Bonsang, Hervé Petetin, Olivier Sanchez, Amandine Rosso and Jean Sciare

44. *Regional air pollution over the South China Sea: modelling and airborne measurements*

Gisèle Krysztofiak, Vanessa Brocchi, Katja Grossmann, Paul Hamer, Virginie Marécal, Anya Reiter, Hans Schlager, Sabine Eckhardt⁵, Klaus Pfeilsticker, and Valéry Catoire*

45. *Aerosol volume size distribution in haze and fog days: impact of humidity*

Lifang Sheng, YichunChai, QianLiu, Wenjun Qu, Wencai Wang , Xiaohong Yao, Yingjia Chu

46. *Chemistry of Nitrogen Oxides and its Roles in Atmospheric Oxidative Capacity in Hong Kong*

Likun Xue, Tao Wang' *, Qiaozhi Zha, Zheng Xu' , Peter K.K. Louie, Connie W.Y. Luk,Wenxing Wang

47. *Vertical structure of foggy haze over Beijing-Tianjin-Hebei area in January 0*

Feng Han Jun Xu, Youjiang He, Lin Peng, Xuezhen Yang, Fan Meng

48. *Relationship between Public perception and Air Pollution Index in Two Typical Cities in China*

Jingchun Duan*, Zhigang Xue, Yan Liu, Fahe Chai

49. *Gaseous emissions from compressed natural gas buses during road tests in China*

Tingting Yue,,Fahe Chai*,Jingnan Hu, Xiaofeng Bao, Xing Guo ,

50. *Toxiology of Fog/Cloud Water in Mt. Tai in Shandong, China*

Dan Li, Chao Zhu, Jiarong Li and Jianmin Chen' *

51. *Characterization of New Particle Formation in Polluted Area, North China*

Xiao Sui, Liang Wen and Jianmin Chen

52. *Using Source Directional Apportionment method to estimate the PM.5 source contributions in city*

Ying-Ze Tian, Guo-Liang Shi, Jian-Hui Wu, Yin-Chang Feng *

53. *Source apportionment studies in Chinese megacities*



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Xing Peng, Guo-Liang Shi, Yu-Fen Zhang*, Yin-Chang Feng*

54. Improved methods for source apportionment in PM_{2.5} in urban areas

Xiao-Yu Zhou, Guo-Liang Shi*, Xiao-Hui Bi, Yin-Chang Feng

55. An investigation of the Ozonolysis of Isoprene under atmospheric Conditions

Yangang Ren, Véronique Daële, Mathieu Cazaunau, Hui Chen, Benoit Grosselin, Abdelwahid Mellouki*

56. Indoor Air Quality:Determination of the Secondary Sources of Formaldehyde in Educational Institutions of the Region Centre of France

Yeny TOBON^[2], Aymeric AGOSTINI^[2], Dawei HU , Benoît GROSSELIN , Abdelwahid MELLOUKI , Corinne Robin , Abderrazak YAHYAOUI , Patrice COLIN , Véronique DAËLE

57. Reaction of OH Radicals with Isopropyl Nitrate: Kinetics and Products

Manolis Romanias, Julien Morin and Yuri Bedjanian

58. Reactions of stabilized Criegee intermediates with SO₂, NO₂, H₂O and O₃

Alexandre Kukui , Hui Chen, Shan Xiao, Wahid Mellouki, and Veronique Daële

59. Photosensitized Radical Formation at the Gas/Particle Interface Leading to Organic Aerosol Growth

Stéphanie Rossignol, Kifle Z. Aregahegn, Liselotte Tinel, Ludovic Fine, Barbara Nozière and Christian George

60. The Role of Experimental and Statistical Uncertainty in Interpretation of Immersion Freezing: A Case for Classical Nucleation Theory

Peter A. Alpert^{*} , Daniel A. Knopf

61. Reactivity of SO₂ with Criegee Biradicals in Heterogeneous Phase: Kinetics and Product Formation

Monica Passananti[¥], Jing Shang[¥], Yoan Dupart, Sébastien Perrier, Christian George

62. Imidazole--carboxaldehyde, a new efficient photosensitizer: fundamental kinetics and proposed mechanism for the formation of halide radicals.

Liselotte Tinel^{*} , Stéphane Dumas, Christian George

63. Transformation of VOCs Induced by Secondary Photosensitizer Hosted within Aerosol Particles as Potential SOA Source

Hongbo Fu[†], Yoan Dupart, Christian George^{*} , and Jianmin Chen^{*}

Additional Posters

64. Experimental study of organosulfate formation at the gas/particle interface from oxidation products of α-pinene



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Geoffroy Duporté, Pierre-Marie Flaud, Sylvie Augagneur, Aline Gratien, Jean-François Doussin, Hélène Budzinski, Eric Villenave and Emilie Perraudin

65. *Gas-phase oxidation of naphthalene, acenaphthylene and acenaphthene initiated by the nitrate radical: Mechanistic study and SOA formation*

Matthieu Riva, Manuela Cirtog, Emilie Perraudin, Bénédicte Picquet-Varrault and Eric Villenave

66. *Evidence for an Unrecognized Anthropogenic Source of Organosulfates: Gas-Phase Oxidation of Polycyclic Aromatic Hydrocarbons in the Presence of Sulfate Aerosol*

Matthieu Riva, Sophie Tomaz, Tianqu Cui, Emilie Perraudin, Elizabeth A. Stone, Eric Villenave and Jason D. Surratt

Posters Withdrawn

67. *East Asian monsoon and tropospheric ozone from IASI/MetOp and the WRF-Chem model*

Sarah Safieddine, Anne Boynard, Pierre-Francois Coheur, Daniel Hurtmans, Boris Quennehen, Jean-Christophe. Raut, Kathy Law, and Cathy Clerbaux'



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Additional Posters



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Experimental study of organosulfate formation at the gas/particle interface from oxidation products of α -pinene

Geoffroy Duporté^{1,2}, Pierre-Marie Flaud^{1,2}, Sylvie Augagneur^{1,2}, Aline Gratien³, Jean-François Doussin³, Hélène Budzinski^{1,2}, Eric Villenave^{1,2} and Emilie Perraudin^{1,2}

¹Univ. Bordeaux, EPOC, UMR 5805, F-33405 Talence Cedex, France

²CNRS, EPOC, UMR 5805, F-33405 Talence Cedex, France

³Univ. Paris Est Créteil (UPEC) and Univ. Paris Diderot (UPD), LISA, UMR 7583, F-9400 Créteil, France

emilie.perraudin@u-bordeaux.fr

Within the highly complex organic fraction of atmospheric aerosol, organosulfates have recently been the subject of particular attention. Indeed, these compounds may account for up to more than 0 % of atmospheric particulate organic matter. Furthermore, terpene-derived organosulfates may be good tracers of anthropogenically enhanced biogenic secondary organic aerosols (SOA). Although organosulfate precursors and formation pathways are only beginning to be explored, these compounds are believed to be formed secondarily in the atmosphere.

In this context, the objective of this study was to provide kinetic and mechanistic data describing heterogeneous organosulfate formation, in order to improve our understanding of multiphase reactions and assess the potential of this process in transferring organic matter from gaseous to particulate phase.

In this work, heterogeneous formation of organosulfates was investigated using a new and fully dedicated experimental set-up. The originality and strength of the approach proposed here is that it is precisely based on the chemical analysis at the molecular level of both gaseous and particulate phases. Model particles were generated from the nebulisation of an

ammonium sulfate/sulfuric acid solution and deposited on a filter. Particles were exposed to a gaseous flow of oxidation products from biogenic volatile organic compounds (or proxies) such as α -pinene oxide, myrtenal... On-line characterisation of the gaseous phase was carried out using a PTR-TOF-MS. Particles were extracted and organosulfates were analysed by LC-MS. Structures of the organosulfates were investigated by high resolution tandem mass spectrometric (LC/Q-TOF/MS). A series of aerosol chamber experiments (CESAM, LISA) was performed to investigate the formation of organosulfates from reactive uptake of monoterpene oxidation products in more realistic conditions. From these experiments, heterogeneous formation of organosulfates and dimers (MW > 400 Da) from alpha-pinene oxide and myrtenal could be evidenced and investigated in various experimental conditions where the role of key-parameters such as particle acidity and relative humidity were studied specifically. These results allow us to present kinetic and mechanistic data for the heterogeneous organosulfate formation. Atmospheric implications of these results will be discussed.



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Gas-phase oxidation of naphthalene, acenaphthylene and acenaphthene initiated by the nitrate radical: Mechanistic study and SOA formation

Matthieu Riva^{1,2}, Manuela Cirtog³, Emilie Perraudin^{1,2}, Bénédicte Picquet-Varrault³ and Eric Villenave^{1,2}

¹Univ. Bordeaux, EPOC, UMR 5805, F-33405 Talence Cedex, France

²CNRS, EPOC, UMR 5805, F-33405 Talence Cedex, France

³Univ. Paris Est Créteil (UPEC) and Univ. Paris Diderot (UPD), LISA, UMR 7583, F-9400 Créteil, France

eric.villenave@u-bordeaux.fr

The aerosol organic fraction constitutes a significant part of urban particulate matter and may play a major role in all air pollution processes. In the atmosphere, the main origin of organic aerosol may often arise from secondary sources. It is well-known that volatile organic compounds (VOCs) such as monoterpenes or monoaromatics are involved in the formation of secondary organic aerosols (SOA). However, the total mass of SOA measured on several sampling sites cannot be explained by the simple presence of such VOCs. Recent studies indicate that PAHs such as naphthalene, acenaphthene and acenaphthylene could be one of the "missing" sources of SOA, particularly in urban areas. NO₃ radical is known to be the main oxidant of VOCs during night time. Different studies have demonstrated the large reactivity of nitrate radicals with volatile organic compounds, especially with unsaturated species. Such high reactivity of NO₃ with some VOCs may lead to significant impact in the formation of SOA.

Reactions of naphthalene, acenaphthene and acenaphthylene with nitrate radicals were carried out in the CSA chamber (LISA, Créteil, France), at room temperature and atmospheric pressure. Gas-phase products were followed in real time using both a proton transfer reaction time-of-flight mass spectrometer (PTR-TOF-MS) and FTIR. A SMPS was used to measure the aerosol concentration, the size distribution and to quantify aerosol formation yields.

This work presents the first exploration of the impact of nitrate radicals on SOA arising from PAH oxidation. Kinetics measurements were also performed in order to determine the reaction rate constants of the three PAHs and the impact of NO₂. Based on the gas-phase identified products, new insights on chemical mechanisms are proposed.



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Evidence for an Unrecognized Anthropogenic Source of Organosulfates: Gas-Phase Oxidation of Polycyclic Aromatic Hydrocarbons in the Presence of Sulfate Aerosol

Matthieu Riva¹, Sophie Tomaz^{2,3}, Tianqu Cui¹, Emilie Perraudin^{2,3}, Elizabeth A. Stone⁴, Eric Villenave^{2,3} and Jason D. Surratt¹

¹Department of Environmental Sciences and Engineering, Gillings School of Global Public Health, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA

²Univ. Bordeaux, EPOC, UMR 5805, F-33405 Talence Cedex, France

³CNRS, EPOC, UMR 5805, F-33405 Talence Cedex, France

⁴Department of Chemistry, University of Iowa, Iowa City, IA 52242, USA

sophie.tomaz@u-bordeaux.fr

Organosulfates are important components of atmospheric fine organic aerosol. However, many of their chemical structures, abundances and sources remain unclear. Formation of organosulfates from the oxidation of biogenic compounds (isoprene, monoterpenes, 2-methyl-3-buten-2-ol (MBO)), in the presence of acidified sulfate aerosol has been characterized in both laboratory-generated and ambient secondary organic aerosol (SOA). Enhancements of SOA mass due to increased aerosol acidity have been partially explained by the presence of organosulfates in the aerosol phase. A recent study demonstrated the presence of organosulfates with an aromatic ring (e.g., benzylsulfate, phenylsulfate) in fine aerosol collected from several major urban locations. Preliminary smog chamber experiments using toluene, nitrogen oxides, and acidified sulfate aerosol did not produce these recently identified organosulfates.

The aim of the present work was to examine the organosulfate formation potential arising from the photooxidation of polycyclic aromatic hydrocarbons (PAHs), which are recognized to be one of the "missing" sources of SOA, particularly in urban areas.

Naphthalene and 2-methyl-naphthalene, which are two of the most abundant gas-phase PAHs, were selected to perform photooxidation experiments in the UNC outdoor smog chamber in the presence of non-acidified and acidified sulfate seed aerosol. Impacts of seed aerosol composition (i.e., MgSO₄ or (NH₄)₂SO₄) and relative humidity on organosulfate formation were examined. Chemical characterization of filters collected from all experiments using ultra performance liquid chromatography coupled to electrospray ionization high-resolution quadrupole time-of-flight mass spectrometry (UPLC/ESI-HR-QTOFMS) revealed the formation of organosulfates from PAH photooxidation in the presence of sulfate aerosol.



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Participant list



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ALPERT Peter

CNRS-IRCELYON

Institut de Recherches sur la Catalyse et l'Environnement de Lyon (IRCELYON)
69626 Villeurbanne
France
Tel : 0437423563
Email : peter.alpert@ircelyon.univ-lyon1.fr

AMIET Franck

AIRMOTEC

13 rue d'artiguelongue
33240 Saint Antoine
France
Tel : 0661301248
Email : yan.pascoli@chromatotec.com

BAI Zhipeng

Chinese Research Academy of Environmental Sciences
#8 Dayangfang, Anhai
100012 Beijing
China
Tel : 8618910785998
Email : baizp@craes.org.cn

BAUDIC Alexia

LSCE
61 Ter avenue de Juvisy
91390 Gif-sur-Yvette
France
Tel : 01.69.08.44.91
Email : alexia.baudic@lsce.ipsl.fr

BERTRAND Amélie

LCE
3 Place Victor Hugo
13001 Marseille
France
Tel : (33) (0)4 72 43 14 8
Email : amelie.bertrand@etu.univ-amu.fr

BESOMBES Jean-Luc

Université de Savoie
Université de Savoie
73376 Le Bourget du Lac
France
Tel : 04 79758109
Email : jean-luc.besombes@univ-savoie.fr

BIANCO Angelica

ICCF
17, Rue Roche Genes
63172 Clermont-Ferrand
France
Tel : 0781741777
Email : angelica.bianco@univ-bpclermont.fr

BOREAVE Antoinette

CNRS-IRCELYON
2 avenue A. Einstein
69626 Villeurbanne
France
Tel : 0472431147
Email : antoinette.boreave@ircelyon.univ-lyon1.fr



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BOYNARD Anne

CNRS-LATMOS
4 place Jussieu
75252 Paris
France
Tel : 0144277099
Email : anne.boynard@latmos.ipsl.fr

CAO Yingying

Beijing Forestry University
NO.35 on tsinghua east road, haidian district,
Beijing, China
100083 Beijing
China
Tel : 15210501791
Email : 1240653767@qq.com

CATOIRE Valéry

CNRS-LPC2E
45071 cedex 2 Orléans
France
Tel : 0683717157
Email : Valery.Catoire@cnrs-orleans.fr

CAZIER Fabrice

Université du Littoral Côte d'Opale
145 av Maurice Schumann
59140 Dunkerque
France
Tel : 03 28 65 82 40
Email : cazier@univ-littoral.fr

CHAI Fahe

Chinese Research Academy of Environmental Sciences
No.8,Dayangfang,Beiyuan Road, Chaoyng District
1000 Beijing
China
Tel : 86-10-84915164
Email : chaifh@craes.org.cn

CHAKIR Abdelkhaleq

GSMA
42 Bvd Docteur ROUX
51100 Reims
France
Tel : 33326829505
Email : abdel.chakir@univ-reims.fr

CHARBONNEL Nicolas

CNRS-IRCELYON
8 rue Désaugiers
69007 Villeurbanne
France
Tel : 0472448110
Email : nicolas.charbonnel@ircelyon.univ-lyon1.fr

CHEH Hui

CNRS-ICARE
1C, Avenue de la Recherche scientifique
45071 Orléans
France
Tel : 0238255050
Email : hui.chen@cnrs-orleans.fr



2014

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CHEN Mindong

Nanjing University of Information Science and Technology
Ningliu Rd 219#
210044 Nanjing
China
Tel : +86-13814078686
Email : chenmd@nuist.edu.cn

CHEN Weidong

Laboratoire de Physico-Chimie de l'Atmosphère
189A, Av. Maurice Schumann
59140 Dunkerque
France
Tel : 0328658264
Email : chen@univ-littoral.fr

CIURARU Raluca

CNRS-IRCELYON
6 rue germain
69006 Villeurbanne
France
Tel : 0437423563
Email : raluca.ciuraru@ircelyon.univ-lyon1.fr

COURCOT Dominique

Université du Littoral Côte d'Opale
UCEIV / ULCO
59140 Dunkerque
France
Tel : 33.(0)3.28.65.82.37
Email : Dominique.Courcot@univ-littoral.fr

DAELE Véronique

CNRS-ICARE
1C, avenue de la recherche scientifique
45071 Orléans
France
Tel : 0238255494
Email : veronique.daele@cnrs-orleans.fr

DANNA Barbara

CNRS-IRCELYON
2 av. albert einstein
69629 Villeurbanne
France
Tel : +472448397
Email : barbara.danna@ircelyon.univ-lyon1.fr

DENG Xuzheng

Shandong Shanda Wit Science and Technology Co., Ltd.
Floor 4th, Huate Plaza, 17703 Jingshi Road
250061 Jinan
China
Tel : +8613853140897
Email : deng5762@sina.com

WU Dexia

Wuxi CAS Photonics Co. Ltd
NO.200, Linghu St, New District
214135 Wuxi
China
Tel : +86-15995250955
Email : dexia_wu@fpi-inc.com



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DING Yan

Chinese Research Academy of Environmental Sciences

Anwai, No.8

100012 Beijing

China

Tel : +86-13601027341

Email : dingyan@craes.org.cn

DU Lin

Shandong University

Shanda South Road 27

250100 Jinan

China

Tel : 0086-531-88366072

Email : lindu@sdu.edu.cn

DUFOUR Gaëlle

CNRS - LISA

94000 Créteil

France

Tel : +33145176546

Email : gaelle.dufour@lisa.u-pec.fr

DUPART Yoan

CNRS-IRCELYON

5 rue de la doua

69626 Villeurbanne

France

Tel : 0437423563

Email : yoan.dupart@ircelyon.univ-lyon1.fr

DUSANTER Sébastien

Ecole des Mines de Douai

941 rue Charles Bourseul

59508 Douai

France

Tel : 0327712623

Email : sebastien.dusanter@mines-douai.fr

EL DIB Giselle

GSMA

Institut de Physique de Rennes

35000 Rennes

France

Tel : 0223235680

Email : gisele.eldib@univ-rennes1.fr

FERTEIN Eric

ULCO

189A Avenue Maurice Schumann

59140 Dunkerque

France

Tel : 0663287482

Email : fertein@univ-littoral.fr

FU Hongbo

CNRS-IRCELYON

20 Rue Collin APT 320

69100 Villeurbanne

France

Tel : 33 6 58 07 70 31

Email : fuhb@fudan.edu.cn



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GARCIA FERNANDEZ Carlos

UTINAM
80 rue battant
25000 Besançon
France
Tel : 0649956086
Email : cgarcia@obs-besancon.fr

GEORGE Christian

CNRS-IRCELYON
69626 Villeurbanne
France
Tel : 0472431489
Email : christian.george@ircelyon.univ-lyon1.fr

GIROIR FENDLER Anne

CNRS-IRCELYON
43 BD DU 11 NOVEMBRE
69622 Villeurbanne
France
Tel : 33 472 431586
Email : giroir@univ-lyon1.fr

GLIGOROVSKI Sasho

Université d'Aix Marseille
10 Avenue Raoul Follereau
13011 Marseille
France
Tel : 0413551052
Email : saso.gligorovski@univ-amu.fr

GRAVENHORST Gode

Universite Goettingen
Blächerallee 6
D 22926 Ahrensburg
Germany
Tel : 0049410258870
Email : gograv@gmail.com

GRONDIN Didier

IRCELYON, Institut de recherches sur la
catalyse et l'environnement de Lyon, UMR5256
69626 Villeurbanne
France
Tel : 0670982421
Email : didier.grondin@ircelyon.univ-lyon1.fr

GUIMBAUD Christophe

CNRS-LPC2E
45071 Orléans
France
Tel : +33 6 12 76 37 48
Email : christophe.guimbaud@cnrs-orleans.fr

SHI Guoliang

Nankai University
Weijin Road 94#
300071 Tianjin
China
Tel : 022 23503397
Email : nksgl@nankai.edu.cn



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HANOUNE Benjamin

PC2A - Bât C11
59655 Villeneuve d'Ascq
France
Tel : 0320434067
Email : benjamin.hanoune@univ-lille1.fr

HAO Jiming

Tsinghua University
100084 Beijing
China
Tel : 861062782195
Email : hjm-den@tsinghua.edu.cn

HE Hong

Research Center for Eco-Environmental
Science, CAS
No.18 Shuangqing road Haidian Dist
100085 Beijing
China
Tel : 861013693111857
Email : honghe@rcees.ac.cn

HERRMANN Hartmut

TROPOS
Institut für Troposphärenforschung
04318 Leipzig
Germany
Tel : +4934127177024
Email : herrmann@tropos.de

TIAN Hezhong

Beijing Normal University
No.19 Xinjiekouwai Street
100875 Beijing
China
Tel : 00861058800176
Email : htian@bnu.edu.cn

MAO Hongjun

Nankai University
94 Weijin Road, Nankai District
300071 Tianjin
China
Tel : +8618602218781
Email : hongjun_mao@hotmail.com

HU Min

Peking University
College of Environmental Sciences and
Engineering
100871 Beijing
China
Tel : 0086-10-62759880
Email : minhu@pku.edu.cn

HUANG Lihui

Shandong University
27 Shanda Nanlu
250100 Jinan
China
Tel : +8613853140897
Email : huanglihui9986@126.com



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JIANG Zhaojun

*Changsha University of Science and Technology
College of Chemical and Biological Engineering,
Changsha University of Science and Technology
410004 Changsha
China
Tel : +86-13874827331
Email : 1364080415@qq.com*

CHEN Jianmin

*Fudan University
220 Handan Road
200433 Shanghai
China
Tel : +86 21 65642298
Email : jmchen@fudan.edu.cn*

KUKUI Alexandre

*CNRS-LPC2E
6 rue Antoine Watteau
45100 Orléans
France
Tel : 0674210146
Email : alexandre.kukui@cnrs-orleans.fr*

LE BRAS Georges

*CNRS-ICARE
91 rue Guy de Maupassant
45100 Orléans
France
Tel : 0673696628
Email : georges.lebras@cnrs-orleans.fr*

LEE Shanhui

*Kent State University
401 Oakwood Dr.
44240 Kent
USA
Tel : 3306712461
Email : sリー19@kent.edu*

LEMON Ed

*Metrohm Applikon B.V.
DE BRAUWWEG 13
3125 AE Schiedam
Netherlands
Tel : +33619362643
Email : ele@metrohm-applikon.com*

LI Hong

*Chinese Research Academy of Environmental Sciences
No.8, Dayangfang, Beiyuan Road, Chaoyang District
100012 Beijing
China
Tel : 86-10-84912734
Email : lihong@craes.org.cn*

LI Mengliang

*China Automotive Technology & Research Center
NO.68, East Xianfeng Road, Dongli District
300300 Tianjin
China
Tel : 022-84379666-6533
Email : xuyy2007@163.com*



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LI Shaping

Shandong University
27 Shanda Nanlu
250100 Jinan
China
Tel : +8613853140897
Email : lishanping@sdu.edu.cn

LI Shu

Xi'an Academy of Environmental Protection Sciences
Green Buildings, 5th Yannan Road, Yanta District
0086 710061 Xi'an
China
Tel : +8613319200393
Email : mine88ss@163.com

LI Xiang

TROPOS - Leibniz-Institut für Troposphärenforschung Abt. Chemie der Atmosphäre Permoserstr. 15
04318 Leipzig
Germany
Tel : +8615902188717
Email : li@tropos.de

SHENG Lifang

Ocean University of China
Sonling Road, Laoshan district
266100 Qingdao
China
Tel : 0086-0532-66782083
Email : shenglf@ouc.edu.cn

LIU Rutao

Shandong University
27 Shanda Nanlu
250100 Jinan
China
Tel : +8613853140897
Email : rutaoliu@sdu.edu.cn

LIU Yao

IFSTTAR
25, Avenue François Mitterrand
69675 Bron
France
Tel : 0472142475
Email : yao.liu@ifsttar.fr

LOUIS Cédric

IFSTTAR
bureau 160
69675 Bron
France
Tel : 0472142503
Email : cedric.louis@ifsttar.fr

LU Hewu

Shandong Guoshun Construction Group Co., Ltd.
Room 501, Block B, Qixing Jixiang Mansion, 29 Wenhua Road
250014 Jinan
China
Tel : +8613853140897
Email : lvhewu_9696@126.com



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MARCHAND Nicolas

LCE
Aix Marseille Université-LCE (case 29)
13003 Marseille
France
Tel : 0617715591
Email : nicolas.marchand@univ-amu.fr

MAXUT Aurelia

CNRS-ILM
2 avenue Albert Einstein
69626 Villeurbanne
France
Tel : 0695238023
Email : aurelia.maxut@ircelyon.univ-lyon1.fr

MELLOUKI Wahid

ICARE-CNRS Av. de la recherche Scientifique
45071 Orléans
France
Tel : 0620180174
Email : mellouki@cnrs-orleans.fr

MENG Fan

Chinese Research Academy of Environmental Sciences
8 Dayangfang, Beiyuan Rd.
100012 Beijing
China
Tel : +86-10-84918049
Email : mengfan@craes.org.cn

MICHOUX Vincent

Ecole des Mines de Douai
941 rue Charles Bourseul CS10838
59508 Douai
France
Tel : 0327712635
Email : vincent.michoud@mines-douai.fr

MIFFRE Alain

CNRS-ILM
10 rue Ada Byron
69100 Villeurbanne
France
Tel : 0472431087
Email : alain.miffre@univ-lyon1.fr

MIRABEL Philippe

Université de Strasbourg
67084 Cedex Strasbourg
France
Tel : (33) 3 68 85 05 36
Email : philippe.mirabel@unistra.fr

MORIN Julien

CNRS-ICARE
59 rue du 11 octobre
45140 Orléans
France
Tel : 0647308629
Email : julien.morin@cnrs-orleans.fr



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NIE Wei

*Shandong University
27 Shanda Nanlu
250100 Jinan
China
Tel : +8613853140897
Email : nwei@sdu.edu.cn*

PASSANANTI Monica

*CNRS-IRCELYON
12 rue des pierres plantées
69001 Villeurbanne
France
Tel : 00330652118893
Email : monica.passananti@ircelyon.univ-lyon1.fr*

PERRAUDIN Emilie

*EPOC
351 cours de la Libération
33 405 Talence
France
Tel : 0033 5 40 00 28 68
Email : e.perraudin@epoc.u-bordeaux1.fr*

PERRIER Sébastien

*CNRS-IRCELYON
2 av Albert Einstein
69626 Villeurbanne
France
Tel : 0437423713
Email : sebastien.perrier@ircelyon.univ-lyon1.fr*

POISSON Nathalie

*CNRS-IRCELYON
27 rue Louis Vicat
75737 Paris
France
Tel : 0147652042
Email : nathalie.poisson@ademe.fr*

PONCZEK Milena

*CNRS-IRCELYON
5, rue de la Doua
69100 Villeurbanne
France
Tel : (33)(0)6 52094011
Email : milena.ponczek@ircelyon.univ-lyon1.fr*

POULET Gilles

*CNRS-LPC2E
45071 Orléans cedex2 Orléans
France
Tel : 0674648707
Email : poulet@cnrs-orleans.fr*

PREVOT André

*Paul Scherrer Institut
Limmattalstr. 38
8049 Zürich
Switzerland
Tel : +41 79 5618950
Email : andre.prevot@psi.ch*



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PROOST Rob

Metrohm Applikon B.V.
DE BRAUWWEGL 13
3125 AE Schiedam
Netherlands
Tel : +31102983576
Email : rpr@metrohm-applikon.com

PRUNAULT Delphine

ARTE
France
Tel :
Email :

REN Yangang

CNRS-ICARE
1C avenue de la Recherche Scientifique
45071 Orléans
France
Tel : 0650796986
Email : yangang.ren@cnrs-orleans.fr

RETAILLEAU-MEVEL Laurence

CNRS-IRCELYON
Bâtiment Chevreul, RDC
69622 Villeurbanne
France
Tel : 0472431590
Email : laurence.retailleau-mevel@ircelyon.univ-lyon1.fr

REY DU BOISSIEU Bénédicte

AIR RHONE-ALPES
3 allée des SORBIERS
69500 Bron
France
Tel : (33) 683340330
Email : breyduboissieu@air-rhonealpes.fr

ROMANIAS Emmanouil

CNRS-ICARE
9 rue Henri Lavedan
45000 Orleans
France
Tel : +33753521931
Email : manolis.romanias@cnrs-orleans.fr

ROSSIGNOL Stéphanie

CNRS-IRCELYON
5, rue de la Doua
69100 Villeurbanne
France
Tel : 04.37.42.36.82
Email : stephanie.rossignol@ircelyon.univ-lyon1.fr

ROTH Estelle

GSMA
gsma
51687 Reims
France
Tel : 0326913231
Email : estelle.roth@univ-reims.fr



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SHANG Jing

CNRS-IRCELYON/Peking University
14 Rue Colin, Villeurbanne
69100 Villeurbanne/Beijing
France
Tel : (0)782599886
Email : shangjing@pku.edu.cn

SHI Zongbo

University of Birmingham
School of Geography Earth and Environmental Sciences
B15 2TT Birmingham
UK
Tel : 4,4121414913e+011
Email : z.shi@bham.ac.uk

SLAMA Remy

INSERM
Team of Environmental Epidemiology
38000 Grenoble
France
Tel : 0476549402
Email : remy.slama@ujf-grenoble.fr

SUI Guodong

Fudan University
220 Handan Road
200433 Shanghai
China
Tel : +86-13564788182
Email : gsui@fudan.edu.cn

SUI Xiao

Shandong University
27 Shandan Road Jinan, China
250100 Jinan
China
Tel : +86 130 6409 2665
Email : 870606769@qq.com

SUN Deshan

Shandong Guoshun Construction Group Co., Ltd.
Room 501, Block B, Qixing Jixiang Mansion, 29 Wenhua Road
250014 Jinan
China
Tel : +8613853140897
Email : sundeshan1963@126.com

WANG Tijian

School of Atmospheric Science, Nanjing University
Hankou Road 22
210023 Nanjing
China
Tel : 8613952003593
Email : tjiangwang@nju.edu.cn

TINEL Liselotte

CNRS-IRCELYON
Rue de la doua
69100 Villeurbanne
France
Tel : 06-13-12-06-81
Email : liselotte.tinel@ircelyon.univ-lyon1.fr



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TOMAZ Sophie

EPOC
351 cours de la Libération
33 405 Talence
France
Tel : 0033 5 40 00 28 68
Email : s.tomaz@epoc.u-bordeaux1.fr

TONG Shengrui

Institute of Chemistry, Chinese Academy of Sciences (ICCAS)
No.2 1st North Street Zhongguancun
100190 Beijing
China
Tel : 86-010-62558682
Email : tongsr@iccas.ac.cn

VERNOUX Philippe

CNRS-IRCELYON
2, Avenue Albert Einstein
69626 Villeurbanne
France
Tel : 00472431587
Email : philippe.vernoux@ircelyon.univ-lyon1.fr

VILLENAVE Eric

EPOC
351 cours de la Libération
33405 Talence
France
Tel : 0033 5 40 00 63 50
Email : e.villenave@epoc.u-bordeaux1.fr

VINATIER Virginie

ICCF
63171 Clermont-Ferrand
France
Tel : +33 473405320
Email : virginie.vinatier@univ-bpclermont.fr

WAN Xueping

Wuxi CAS Photonics Co. Ltd
NO.200, Linghu St, New District
214135 Wuxi
China
Tel : +86-13921186118
Email : xueping_wan@fpi-inc.com

WANG Haitao

State Key Laboratory of NBC Protection for Civilian
No. 37 south central street, Changping district
102205 Beijing
China
Tel : +8613552082973
Email : dr_wht@163.com

WANG Jinglei

Hangzhou Wmade Intelligent Technology Co.,Ltd
Moganshan road 1418-36
310000 Hangzhou
China
Tel : 1336060910
Email : wwwjll@126.com



2014

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WANG Jinhe

Shandong Jianzhu University
Fengming Road, Lingang Development Zone
250101 Jinan
China
Tel : +8613853140897
Email : jinhewang@263.net

WANG Ning

Shandong Jianzhu University
Fengming Road, Lingang Development Zone
250101 Jinan
China
Tel : +8613853140897
Email : wangning@sdjzu.edu.cn

WANG Shuxiao

Tsinghua University
School of Environment
100084 Beijing
China
Tel : 86-10-62771466
Email : shxwang@tsinghua.edu.cn

WANG Xinming

Guangzhou Institute of Geochemistry, CAS
511 Kehua Rd., Tianhe
510640 Guangzhou
China
Tel : +86-20-85290180
Email : wangxm@gig.ac.cn

WIRGOT Nolwenn

ICCF
1 rue du Puits Artesien
63000 Clermont-Ferrand
France
Tel : 06 89 62 52 00
Email : nolwenn.n@wanadoo.fr

WU Beili

Fudan University
1324 Shuidian Road, lane 2, 10-501
200434 Shanghai
China
Tel : 18001749117
Email : wubl@fudan.edu.cn

WU Hongxiang

Fudan University
220, Handan road
200433 Shanghai
China
Tel : 8,613816588e+012
Email : hongxwu@fudan.edu.cn

XU Yueyun

China Automotive Technology and Research
Center
NO.68,East Xianfeng Road, Dongli District
300300 Tianjin
China
Tel : 022-84379666-6533
Email : xuyueyun@catarc.ac.cn



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XUE Zhigang

Chinese research academy of environmental sciences

Anwai dayangfang 8#

100012 Beijing

China

Tel : 86-10-84915281

Email : xuezg@craes.org.cn

YANG Weiqing

Shandong Shanda Wit Science and Technology Co., Ltd.

Floor 4th, Huate Plaza, 17703 Jingshi Road

2500061 Jinan

China

Tel : +8613853140897

Email : younger@sdu.edu.cn

YANG Xin

Fudan University

220 Guoding Road

200433 Shanghai

China

Tel : 86-21-55665272

Email : yangxin@fudan.edu.cn

TIAN Yingze

Nankai University

Weijin Road 94#

300071 Tianjin

China

Tel : 022 23503397

Email : tianyingze@126.com

MU Yujing

Research Center for Eco-Environmental Science, CAS

18# Shuangqing Road, Haidian District

100085 Beijing

China

Tel : 8610-62849125

Email : yjmu@rcees.ac.cn

ZHANG Qijie

ARIA Technologies

8-10 rue de la ferme

92100 Boulogne-Billancourt

France

Tel : 06 13 12 09 18

Email : qzhang@aria.fr

ZHANG Shouwen

Mines Douai

941 rue Charles Bourseul

59500 Douai

France

Tel : 03 27 71 26 06

Email : shouwen.zhang@mines-douai.fr

ZHAO Chunhua

CNRS-IRCELYON

2 avenue Albert Einstein

69626 Villeurbanne

France

Tel : 0662374456

Email : chunhua.zhao@ircelyon.univ-lyon1.fr



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ZHAO Mai

SPC Environment Protection Tech Co.,Ltd
11 level, Renminzhengxiebao Buildng, No.69
Xibali zhuan Road, Haidian District, Beijing,
China
100142 Beijing
China
Tel : 13911820187
Email : zhaom@qingxin.com.cn

ZHENG Jun

Nanjing University of Information Science and
Technology
Ningliu Rd 219#
210044 Nanjing
China
Tel : +86-18251919852
Email : junzheng70@163.com

ZHENG Mei

Peking University, No.5 Yiheyuan Road Haidian
District
100871 Beijing
China
Tel : +86-15201680138
Email : mzheng@pku.edu.cn

ZHI Kangbo

Hangzhou Wmade Intelligent Technology
Co.,Ltd
Moganshan road 1418-36
310000 Hangzhou
China
Tel : 13777840070
Email : zhikb@126.com



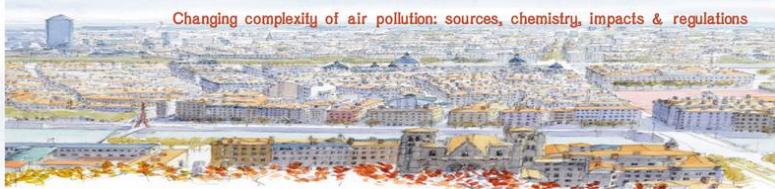
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Changing complexity of air pollution: sources, chemistry, impacts & regulations



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The scientific exchanges will take place on December 11 and 12, 2014 at

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DETAILS

REGION RHONE-ALPES
esplanade François Mitterrand
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Telephone : +33 (0)4 26 73 40 00

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