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

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

ILM

Institut Lumière Matière

CNRS-ICARE

Institut de Combustion, Aérothermique, Réactivité et Environnement

CRAES-MEP

Chinese Research Academy of Environmental Sciences

RCEES-CAS

Research Centre for Eco-Environmental Sciences

FDU

Fudan University

SDU

Shandong University

Hosted by: Région Rhône-Alpes
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 - IRCLEYON - 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
   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
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

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 NOx and SO₂

Source apportionment of particulate matter using off-line and on-line aerosol mass spectrometry in China

17:10: Prof. Ximing 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*


*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*


*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
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


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


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
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**
   

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 N$_2$O$_5$ and ClNO$_2$ at urban and rural sites in Hong Kong and China**
    

11. **Seasonal, Diurnal and Nocturnal Variations of BTEX Compounds in the Semi-Urban Environment of Orleans, France**
12. **Pollution Status of Ambient Volatile Organic Compounds in China**
   Zhaohui Jiang, Abdelwahid Mellouki*, Benoît Grosselin1, Véronique Daële1, Mathieu Cazaunau1, Yujing Mu

13. **Simulation of the Impact of Plants on the Atmospheric Particle Size Distribution of PM$_{2.5}$**
   JunqiDING*, 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 PM$_{2.5}$ 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 Kfoury, 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 Zetsch, 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
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 $\delta^{13}$C of CO from various ecosystems to atmosphere

Christophe Guimbaud, Cécile Noel, Benoît d’Angelo, Sébastien Gogo, Michel Chartier, Calude 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 departement 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 2008

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 airbone 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, Veronique 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
Virginie Vinatier, Mickael Vaïtilingom*, Laurent DEGUIILLAUME, Marie CHEIZE, Pierre AMATO, Martine SANCELME Géraldine SARTHOU, Gilles MAILHOT, Anne-Marie DELOURT

33. Impact of wood burning in an Alpine valley

Florie Chevrier*, Griša Močnik, Guillaume Brulfert, Jean-Paul Laurent, Jean-Luc Jaffrezo and Jean-Luc Besombes*

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

Carlos García-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 Lakshmipathi* and Gisèle El Dib

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

Gisèle El Dib*, Chantal Sleiman, Hichem Bouzidi, Alberto Moreno, Alexandre Tomas*, Estelle Roth, Bernabé Ballesteros, André Canosa, José Albaladejo and Abdelkhaleq Chakir

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


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
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 Eckhardt, Klaus Pfeilsticker, and Valéry Catoire*

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

Lifang Sheng, Yichun Chai, Qian Liu, Wenjun Qu, Wencai Wang, Xiaohong Yao, Yingjia Chu

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


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 Liand 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 0.5 source contributions in city*

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

53. *Source apportionment studies in Chinese megacities*
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¥, Aymeric AGOSTINI¥, 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 SO$_2$, NO$_2$, H$_2$O and O$_3$

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 SO$_2$ with Criegee Biradicals in Heterogeneous Phase: Kinetics and Product Formation

Monica Passananti¥, Jing Shang¥, Yoan Dupart, Sebastien 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
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


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-François Coheur, Daniel Hurtmans, Boris Quennehen, Jean-Christophe. Raut, Kathy Law, and Cathy Clerbaux
Additional Posters
Experimental study of organosulfate formation at the gas/particle interface from oxidation products of α-pinene

Geoffroy Duporté1,2, Pierre-Marie Flaud1,2, Sylvie Augagneur1,2, Aline Gratien3, Jean-François Doussin3, Hélène Budzinski1,2, Eric Villenave1,2 and Emilie Perraudin1,2

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

Matthieu Riva\textsuperscript{1,2}, Manuela Cirtog\textsuperscript{3}, Emilie Perraudin\textsuperscript{1,2}, Bénédicte Picquet-Varrault\textsuperscript{3} and Eric Villenave\textsuperscript{1,2}

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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. NO\textsubscript{3} 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 NO\textsubscript{3} 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 NO\textsubscript{2}. Based on the gas-phase identified products, new insights on chemical mechanisms are proposed.
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

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.
Participant list
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