



ACC | AQSM

**Australia-China Centre  
for Air Quality Science and Management**

Annual Report

2015

## 1. Introduction

The ACC-AQSM was launched at the Chinese Research Academy of Environmental Sciences in Beijing, in December 2014.

Our aim is to provide a platform for joint research to further understanding of the multi-dimensional problem of air pollution at all scales and its impact on human health and the environment, to provide technological and innovative solutions to the problem and continued effective monitoring of pollution sources, and to provide input into national policies that enable informed, efficient and regulated management and control.

The Centre operates as a virtual centre based at three offices, the: Queensland University of Technology (QUT), Chinese Research Academy of Environmental Science (CRAES), and Hong Kong University of Science and Technology (HKUST), and manage all research activities under the Centre banner established at each of the partner institutions. The Managing Offices are established to run the day to day activities of the Centre.

## 2. The Centre

### *Board*

The Board provides strategic advice to the Executive Committee on the full range of Centre activities and ensure that the Centre has clear objectives, and makes the most effective and efficient use of resources in order to achieve these objectives. The Board consists of two Chairs (the inaugural chairs in Australia: Prof. Ian Mackinnon, QUT; and in China, Professor Jiming Hao, Tsinghua University), a Vice-Chair (Professor Joseph Lee, HKUST). It also includes representatives from some of the partner institutions and relevant stakeholders.

### *Executive Committee*

The Executive Committee consists of three Directors (the inaugural Directors in Australia: Professor Lidia Morawska, QUT; in China, Professor Fahe Chai, CRAES; in China HK, Prof. Christopher Chao, HKUST). The Deputy-Directors (or Executive Committee Members) represents the partner institutions. The Executive Committee is established as the primary decision making forum for the collaborative Centre and maintains close contact with the Board between Board meetings in ways the Executive Committee considers appropriate, or the Board determines. The Executive Committee keeps the Board informed of important issues.

### *Executive Committee / Research Leadership Teams*

The Executive Committee is organised in the following Teams:

- Planning
- Internal co-ordination
- Training
- Research funding
- External collaboration
- Communication
- Implementation

### *Member Organisations – China*

- Chinese Research Academy of Environmental Science (CRAES)
- East China University of Science and Technology (ECUST)
- Fudan University (FDU)
- Hong Kong City University (HK CityU)
- Hong Kong Polytechnic University (HK PolyU)
- Hong Kong University (HKU)
- Hong Kong University of Science and Technology (HKUST)
- Peking University (PKU)

- Shanghai Academy of Environmental Sciences (SAES)
- Tsinghua University (TU)

### *Member Organisations – Australia*

- CSIRO Oceans and Atmosphere (CSIRO)
- Curtin University (CU)
- Queensland University of Technology (QUT)
- University of New South Wales (UNSW)
- University of Sydney (USyd)

### *New Members*

- The Curtin University, Perth, Western Australia signed the Addendum to the Centre Agreement at the Annual Meeting in Brisbane in December 2015.

### *Key Supporting Organisations*

#### **Australia**

- Department of Science, Information Technology, and Innovation (DSITI)

#### **China**

- Clean Air Asia
- Ministry of Environmental Protection (MEP)
- Ministry of Science and Technology
- Beijing Environment Protection Bureau
- Science and Technology Commission of Shanghai Municipality
- Shanghai Meteorology Bureau

#### **Global**

- Clean Air Asia Centre
- World Health Organisation, Geneva

### *Research Themes*

The Centre is organised in the following four Themes:

- Theme 1: **Source Characterization and Emissions**
- Theme 2: **Pollution Sources, Dynamics, & Atmospheric Impacts (or Processes)**
- Theme 3: **Exposure, Health Effects & Wellbeing**
- Theme 4: **Airborne Infection Spread & Control**

## **3. Communication**

### *News*

- **1 December 2014:** The ACC-AQSM was launched on 5 December 2014 at Beijing's Chinese Research Academy for Environmental Sciences (CRAES).
- **1 December 2015:** The ACC-AQSM launched last year in Beijing, is celebrating its first anniversary! The Queensland University of Technology is hosted the first Annual Meeting of the Centre in Brisbane, Australia from the 1 – 2 December 2015.
- **5 December 2015:** The ACC-AQSM celebrated its first anniversary today!

### *Web*

- The English version is live: <http://www.accaqsm.org/>

## 4. Events / Workshops

### *Celebration at QUT*

On Wednesday, 3 June 2015, a Celebration of the opening of the Australian office of the ACC-AQSM at QUT, was hosted by the Institute for Future Environments at QUT. This event coincided with celebrating 20 Years of Queensland Government and QUT Collaboration on Air Quality Monitoring. Presentations were given by Professor Scott Sheppard, DVC (International & Development), QUT; Dr Christine Williams, Assistant Director-General, Science Division, Department of Science, Information Technology and Innovation (DSITI); Dr Yongchen Zhao, Consul General, The Consulate General of the P.R. China in Brisbane; Professor Lidia Morawska, ILAQH, QUT and Director – Australia, ACC-AQSM. There were about 50 people from QLD Government, QUT and other universities and institutes attending this event.

### *Field Campaigns*

#### ***Hong Kong City University Campaign, September – December 2015***

The Hong Kong campaign was carried out by the Hong Kong City University (HK CityU), and was led by Professor Peter Brimblecombe and Professor Zhi Ning from the HK CityU. Dr Svetlana Stevanovic was a Visiting Assistant Professor at City University of Hong Kong in the period September –December 2015. She participated in a research campaign that was a part of a project “Semi-volatile particulate matter (PM) species in roadside environment: Role in gas-particle partitioning and formation of oxidative potential”. This project was a joint project of Professor Zoran Ristovski from QUT and Assistant Professor Zhi Ning from City University of Hong Kong funded by HK Research Grants Council.

Measurements were carried out at two locations that represented background and road-side pollution. Evaluation of diurnal profiles of ROS concentrations at different locations in Hong Kong was done for the first time in Australasia. For the measurement of oxidative potential Particle Into Liquid Sampler (PILS) was used. This instrument was designed and made at QUT.

Furthermore, PILS was also used to measure the influence of semi-volatile organics to the overall oxidative potential and investigate further gas-particle partitioning. This campaign was done in December and January to characterize winter emissions. Corresponding summer campaign is planned for August 2016. Professor Zoran Ristovski was supervising the measurements and was a Visiting Professor in the School of Energy and Environment at the City University of Hong Kong.

#### ***Beijing Air Quality Monitoring Project, November – December 2015***

The Beijing Air Quality Monitoring campaign was carried out by the Chinese Research Academy of Environmental Sciences (CRAES) and was led by Professor Fahe Chai, Vice-President of the CRAES. Dr Congrong He and Dr Rohan Jayaratne, Senior Research Fellows from the International Laboratory for Air Quality and Health (ILAQH), Queensland University of Technology (QUT) spent five days in Beijing assisting with the project. The ILAQH provided a neutral cluster and air ion spectrometer to support this project. This is the first time that ion clusters and particles have been monitored in Beijing in the actual size range where particle formation takes place. The monitoring period included several highly record breaking polluted haze days. The data is now being processed and analysed by one of ILAQH's PhD students, Ms Buddhi Pushpawela.

#### ***Yangtze River Air Monitoring Campaign, November – December 2015***

The Yangtze River Air Monitoring Campaign was carried out by Fudan University and was led by Professor Jianmin Chen from the FDU. Air and water quality measurements were made from a research boat carrying over 60 state of the art, high quality scientific instruments while sailing from Shanghai to Wuhan and back over a period of two weeks. The ILAQH provided one instrument to monitor ultrafine particle concentrations in real time and it was installed on the boat by Dr. Rohan Jayaratne, Senior Research Fellow at the ILAQH. The Project was a success and we are presently analysing the results acquired. We expect this to result in several high quality scientific publications. The data is now being processed and analysed by one of ILAQH's PhD students, Mr Samart (Alex) Porncharoen.

### *Executive Committee meetings*

- The EC held a Skype Meeting on 16 March 2015.
- The EC met face to face on 17 June 2015 at the CRAES in Beijing.

- The EC held a Skype Meeting on 27 August 2015.
- The EC met face to face on 30 November 2015 at QUT in Brisbane.

### *ACC-AQSM Shanghai Workshop*

The ACC-AQSM workshop was held on the 29 October 2015 at the Hengshanbeijiao Hotel, Gucun Park, Shanghai, China. It was hosted by the Fudan University, and organised in co-operation with the East China University of Science and Technology, and the Shanghai Academy of Environmental Sciences. Participants in the workshop included, the:

- Fudan University,
- Queensland University of Technology,
- East China University of Science and Technology,
- Shanghai Academy of Environmental Sciences,
- Chinese Research Academy of Environmental Sciences,
- Shanghai Environmental Monitoring Center,
- Tongji University, and
- Shanghai University.

The topic of the workshop included: a new generation of sensors – utilizing them for air quality and exposure assessments in Shanghai, particle characteristics and its health effects, ozonolysis of unsaturated fatty acids, monitoring and analysing sources of PM<sub>2.5</sub> in Shanghai, efforts to improve indoor air quality for residential and office buildings, VOCs emission and its potential relation to SOA, development and application of multi-time resolution PM source apportionment, and source apportionment of fine particles and its chemical components over the Yangtze. Further opportunities for collaborative activities were identified.

### *Annual Meeting*

The Annual Meeting is hosted at rotating partner sites in Australia and China to provide an opportunity for member researchers to present and discuss findings, workshop future initiatives and exchange information.

The first Annual Meeting of the ACC-AQSM was held at QUT in Brisbane, Australia from the 30 November – 2 December 2015, celebrated the first anniversary since the Centre launch, and was attended by top Chinese and Australian experts in air pollution and its management. The opening session summarized the status quo in Chinese and global air quality trends, as well as the state of the art of its management. Presentations were given by Professor Scott Sheppard, DVC (International & Development), QUT; Dr Christine Williams, Assistant Director-General, Science Division, DSITI, Queensland Government; Dr Yongchen Zhao, Consul General, The Consulate General of the P.R. China in Brisbane; Professor Lidia Morawska, ILAQH, QUT and Director – Australia, ACC-AQSM; Dr Jian Gao, CRAES and Secretary-General of the ACC-AQSM; Professor Jiming Hao, Dean of the Institute of Environmental Sciences and Engineering at Tsinghua University; Professor Jianmin Chen, Department of Environmental Science and Engineering, FDU; Professor Tong Zhu, College of Environmental Science and Engineering, PKU; and Dr Melita Keywood, Stream Leader, Aerosol Science and Climate Change, CSIRO. The program also included scientific sessions, field trips, and interactive discussions.

Overall, the Annual Meeting further refines plans for our research collaborations, and identification for longer term opportunities for staff and student exchange, professional development collaborations, and research developments that combine the expertise of a number of Chinese and Australian Universities and Institutes.

### *Visits and Exchanges (Staff and Students)*

- A/Prof D Tjondronegoro (QUT), hosted by SAES, June 2015.
- Prof Zoran Ristovski (QUT), hosted by HK CityU, August to October 2015
- Dr Melita Keywood (CSIRO), hosted by CRAES, September 2015
- Prof Lidia Morawska (QUT), hosted by the Fudan and ECUST, October 2015
- Dr Svetlana Stevanovic (QUT), hosted by HK CityU, October to December 2015
- Prof Lidia Morawska (QUT), hosted by Tsinghua University, November 2015
- Dr Rohan Jayaratne (QUT), hosted by Fudan and CRAES, November 2015
- Dr Congrong He (QUT), hosted by CRAES, November 2015

## 5. Research Projects (Ongoing and Planned)

1. Hong Kong Research Council Grant 2016, titled: **Thermal desorption aerosol gas chromatograph and time of flight aerosol mass spectrometer**. Led by Hai GUO from the Hong Kong Polytechnic University, investigators include: Lidia Morawska (QUT), Xiangdong Li (HK PolyU), Chak Chan (HKUST), Xinming Wang (CAS), Linwei Tian (HKU), Kin-Fei Ho (CUHK), Man-Nin Chan (CUHK), Zi Ning (HK City).
2. NSFC Funded Project, titled: **Identification and Evaluation of Key Impact Factors on the Multiple-Time-Resolution Particle Source Apportionment and Its Comprehensive Validation over Beijing-Tianjin-Hebei Region**. Led by Dr. Jian GAO from the Chinese Research Academy of Environmental Sciences, investigators include: Jian GAO, YiSheng XU, Shuang DENG, Yingjie SHI, Kai LI, Yingze TIAN, Caiqing YAN, Miikka Ilmari Dal Maso, Lidia MORAWSKA, Zhisheng ZHANG
3. NSFC Funded Project, titled: **Concentrations and Compositions of Biogenic Volatile Organic Compounds in Forests of Heavy Photochemical Pollution Regions and Their Role in Secondary Pollutant Formation**. Led by Prof Boguang WANG from Jinan University (Guangzhou), investigators include: Boguang WANG, Linyan HE, Wei SONG, Hao WANG, Duohong CHEN, Lei ZHOU, Congrong HE, Peng CHENG, Yunpeng LI, Zhijuan ZHANG
4. **Cooking Emissions**. Lina Wang (ECUST), Hongli Wang (SAE), Jun Gao (Tongji U), Svetlana Stevanovic (QUT), Zoran Ristovski (QUT)
5. **Real time Measurements of ROS**. Svetlana Stevanovic (QUT), Zhi Ning (HK CityU)
6. **Contribution of Primary Sources (Traffic, Biomass Burning) to SOA formation** Li Hong (CRAES) – TBA
7. **Assessment of Air Pollution Exposure during Construction Work: Towards the Improvement of Dust Control and Management in the Construction Industry**. Bo Xia (QUT), Geoffrey Shen (HK PolyU), Martin Skitmor (QUT), Dongping FANG (TU), Robin Drogemuller (QUT), Dezhi LI (Southeast University), Lidia Morawska (QUT), Congrong He (QUT)
8. **New particle formation in Beijing air – winter campaign, measurements and modelling**. Jian Gao (CRAES), Rohan Jayaratne (QUT), Buddhi Pushpawela (QUT), Min Hu (PKU), Melita Keywood (CSIRO), Congrong He (QUT)
9. **Yangtze River Campaign**. Jianmin Chen (FUD), Rohan Jayaratne (QUT)
10. **Impact of autumn agricultural burning on air quality in Beijing**. Jian Gao (CRAES), Congrong He (QUT)
11. **Application of the camera for atmospheric PM measurements**. Lidia Morawska (QUT), Rohan Jayaratne (QUT), Jian Gao (CRAES), Lina Wang (ECUST), Md Mahmudur Rahman (QUT)
12. **Sensor Intercomparison**. Jian Gao (CRAES), Shuxiao Wang (TU), Lidia Morawska (QUT), Phong Thai (QUT), Mandana Mazaheri (QUT), Christina Candido (USyd)
13. **School children personal exposure to UFP**. Zhu Tong (PKU), Lidia Morawska (QUT), Mandana Mazaheri (QUT), WeiWei Lin (Sun Yat-Sen University)
14. **Temperature, air quality and health effects**. Haidong Kan (FDU), Adrian Barnett (QUT), Lidia Morawska (QUT), Phong Thai (QUT), Yuming Guo (UQ)
15. **Epidemiology**. Ben Mullins (CU), Jing (Peter) Ming (CMA)
16. **Environmental pollution and adverse birth outcomes**. Gunther Paul (QUT), Guanghui Dong (SYSU), Lidia Morawska (QUT)

## 6. Special Issue, Science of the Total Environment (STOTEN)

During the Executive Committee of the ACC-AQSM in June 2015, the idea of putting together a Special Issue focused on current and emerging air quality issues in China was discussed, was submitted to and accepted by the *Science of the Total Environment* (STOTEN) journal. The Special Issue is titled, "Air Quality in China: Current and Emerging Challenges", and the Guest Editors are Professor Lidia Morawska (QUT), Professor Jianmin Chen (FDU), and Professor Tao Wang (HK PolyU). A total of 42 review and original papers was proposed. The lead authors have identified for all of the papers, the manuscripts are in preparation, and 9 papers have already been submitted to STOTEN and are under review. The submission deadline is the 30 June 2015.

## 7. Grant Applications

### Successful

- NSFC Funded Project starting February 2016, titled: **Identification and Evaluation of Key Impact Factors on the Multiple-Time-Resolution Particle Source Apportionment and Its Comprehensive Validation over Beijing-Tianjin-Hebei Region**. Led by Dr. Jian GAO from the Chinese Research Academy of Environmental Sciences, investigators include: Jian GAO, YiSheng XU, Shuang DENG, Yingjie SHI, Kai LI, Yingze TIAN, Caiqing YAN, Miikka Ilmari Dal Maso, Lidia MORAWSKA, Zhisheng ZHANG
- NSFC Funded Project starting February 2016, titled: **Concentrations and Compositions of Biogenic Volatile Organic Compounds in Forests of Heavy Photochemical Pollution Regions and Their Role in Secondary Pollutant Formation**. Led by Prof Boguang WANG from Jinan University (Guangzhou), investigators include: Boguang WANG, Linyan HE, Wei SONG, Hao WANG, Duohong CHEN, Lei ZHOU, Congrong HE, Peng CHENG, Yunpeng LI, Zhijuan ZHANG
- Hong Kong Research Council Grant 2016, titled: **Thermal desorption aerosol gas chromatograph and time of flight aerosol mass spectrometer**. Led by Hai GUO from the Hong Kong Polytechnic University, investigators include: Lidia Morawska (QUT), Xiangdong Li (HK PolyU), Chak Chan (HKUST), Xinming Wang (CAS), Linwei Tian (HKU), Kin-Fei Ho (CUHK), Man-Nin Chan (CUHK), Zi Ning (HK City).

### Pending

- Australian Research Council Discovery Projects Grant led by Lidia Morawska (QUT), titled: **Making assessment of personal exposure to air pollution available to every citizen**. Chinese Partner Investigators: FDU
- Asian Universities Cluster Application led by Hai Guo (HK PolyU), titled: **Impacts of Megacities on Regional Atmospheric Environment — A comparative study of emission, transformation and effects of urban pollution from Singapore, Shanghai, and Hong Kong**

### Submitted

- Australian Research Council Linkage Projects Grants led by Lidia Morawska (QUT), titled: **Utilisation of satellite observations for advancement of Australian air quality science and management**. Chinese Partner Investigators: PKU
- Australia Research Council Linkage Projects Grant 2016, titled: **Establishing advanced networks for air quality sensing and analysis**. Led by Lidia Morawska from the Queensland University of Technology, investigators include: Kourosh Kalantar-zadeh (RMIT), Nunzio Motta (QUT), Benjamin Mullins (CU), Godwin Ayoko (QUT), Zoran Ristovski (QUT), Mandana Mazaheri (QUT), Samuel Clifford (QUT), Matthew Dunbabin (QUT), Phong Thai (QUT), Luis Gonzalez (QUT), Dian Tjondronegoro (QUT), Matthew Riley (NSW OEH), Yvonne Scorgie (NSW OEH), David Wainwright (DSITI), Gavin Fisher (VIC EPA), Kelvyn Steer (SA EPA), Elizabeth Ebert (BOM), Jiming HAO (TU)

*To be submitted in the next round*

- NSFC application led by Jianmin Chen (FDU), titled: ***Human health and exposure risk assessment to atmospheric fine particles***. Project Investigator Australia: Prof Lidia Morawska (QUT); Main Participants: Dr Dan Li (FDU); Dr Rohan Jayaratne (QUT), Dr Mandana Mazaheri (QUT)