



# **International Laboratory for Air Quality and Health**

**WHO Collaborating Centre**

## **ANNUAL REPORT 2016**

**INTERNATIONAL LABORATORY FOR AIR  
QUALITY and HEALTH (ILAQH)**

**WORLD HEALTH ORGANISATION  
COLLABORATING CENTRE FOR AIR QUALITY  
AND HEALTH**

## 1. Introduction

The International Laboratory for Air Quality and Health (ILAQH) is part of the Institute for Health and Biomedical Innovation (IHBI) and the Institute for Future Environments (IFE), at the Queensland University of Technology (QUT). ILAQH undertakes research, postgraduate training and consultancy in the complex, interdisciplinary field of air quality and its impact on human health, with a specific focus on ultrafine and nanoparticles. The three main aspects of ILAQH research activities are:

- Comprehensive characterisation of indoor and outdoor air, including emission sources;
- Integrated health and environmental risk assessments; and
- Strategies for controlling and managing air pollutants.

To address the challenge related to the interdisciplinary nature of air pollution and its impact on human health, academics from a number of Faculties within QUT are involved with the programs undertaken by the ILAQH, including discipline areas such as: physics, chemistry, microbiology, mathematics, public health and engineering. The expertise of the ILAQH personnel is strengthened by close collaboration with a number of government and non-government organizations. Through joint research, lecturing and postgraduate student supervision, the ILAQH collaborates closely with a number of North American, European and Asian research and tertiary organizations.

The facility is equipped with state of the art instrumentation for aerosol generation, mass and number size classification; monitoring of atmospheric gases; real time biological studies; vehicle emission testing, filter testing, lung deposition studies, and computer modelling. Access to electron microscopy and analytical chemistry facilities is available through the links existing within the Science and Engineering Faculty.

ILAQH has built up a scientific program, which is recognised internationally through a high publication rate in reputable international journals, visits by scholars from around the world to the facility, and invitations to the ILAQH key researchers to address international conferences and participate in international initiatives. In Australia both the Queensland State and the Federal government and non-government organizations regularly seek the expertise of this facility.

ILAQH is a Collaborating Centre of the World Health Organization on Research and Training in the field of Air Quality and Health, since 2004.

## **2. ILAQH Researchers in 2016**

### **Director**

Professor Lidia Morawska, PhD (School of Chemistry, Physics & Mechanical Engineering)

### **Academic Staff**

Professor Godwin Ayoko (School of Chemistry, Physics & Mechanical Engineering)

Professor Zoran Ristovski (School of Chemistry, Physics & Mechanical Engineering)

Dr Branka Miljevic (School of Chemistry, Physics & Mechanical Engineering)

Dr Graham Johnson (School of Chemistry, Physics & Mechanical Engineering)

### **Research Fellows / Associates**

Dr Congrong He

Dr Mandana Mazaheri

Dr Phong Thai

Dr Rohan Jayaratne

Dr Sam Clifford

Dr Svetlana Stevanovic

### **Research Fellowships**

Dr Wei Wang

### **Associated Academic Adjunct Staff**

Adjunct Prof Giorgio Buonanno (University of Cassino, Italy)

Adjunct Prof Tunga Salthammer (Fraunhofer WKI, Germany)

Adjunct Prof Werner Hoffman (University of Salzburg, Austria)

### **Postgraduate & Research Co-ordinator**

Ms Chantal Labbe

### **Doctoral Students**

Akwasi Bonsu Asumadu-Sakyi (Supervisor: Lidia Morawska)

Alma de Jesus (Supervisor: Lidia Morawska)

Andjelija Milic (Supervisor: Zoran Ristovski)

Bijan Yeganeh (Supervisor: Lidia Morawska)

Buddhi Pushpawela (Supervisor: Rohan Jayaratne)

Chiemiwo Godday Osuagwu (Supervisor: Branka Miljevic)

David Burns (Supervisor: Zoran Ristovski)

Joel Alroe (Supervisor: Zoran Ristovski)

Luke Cravigan (Supervisor: Zoran Ristovski)

Marc Mallet (Supervisor: Branka Miljevic)

Mawutorli Nyarku (Supervisor: Lidia Morawska)

Meng Xiu (Supervisor: Phong Thai)

Md Mahmudur Rahman (Supervisor: Lidia Morawska)

Mohammad Jafari (Supervisor: Zoran Ristovski)

Reece Brown (Supervisor: Zoran Ristovski)

Rusdin Laiman (Supervisor: Lidia Morawska)

Samart Porncharoen (Supervisor: Lidia Morawska)

Sarah Lawson (Supervisor: Zoran Ristovski)  
Tommaso Villa (Supervisor: Lidia Morawska)  
Xiaoting Liu (Supervisor: Lidia Morawska)  
Yi Guo (Supervisor: Zoran Ristovski)

**Doctoral Students (enrolled in other QUT Schools and other Universities)**

Farhad Hossein (Engineering, Supervisor: Richard Brown)  
Meisam Babaie (Engineering, Supervisor: Richard Brown)  
Md Animul Islam (Engineering, Supervisor: Richard Brown)  
Md Jahirul Islam (Engineering, Supervisor: Richard Brown)  
Md Saidul Islam (Engineering, Supervisor: Richard Brown)  
Thuy Chu Van (Engineering, Supervisor: Richard Brown)

**Masters Students**

Soon-Che Chan (Supervisor: Godwin Ayoko)

**Honours Students**

Nassib Jabbour (Supervisor: Graham Johnson)

**Postgraduate Completions, PhD**

Farzaneh Hedayat (Supervisor: Zoran Ristovski)  
Jana Adamovska (Supervisor: Zoran Ristovski)  
Marc Mallet (Supervisor: Branka Miljevic)  
Peter McGarry (Supervisor: Lidia Morawska)  
Tenzin Wangchuk (Supervisor: Lidia Morawska)

**Postgraduate Completions, Masters**

Praveen Vijaysegaran (Supervisor: Lidia Morawska)

### 3. Major Developments

Our paper titled, *Emergence and spread of a human-transmissible multidrug-resistant nontuberculous mycobacterium*, has been published in the journal *Science*. This is a collaboration with several Centres around the world. The Brisbane Centres involved include: International Laboratory for Air Quality and Health (QUT); Queensland Institute of Medical Research (QIMR) Berghofer Medical Research Institute; The Prince Charles Hospital (TPCH); Lady Cilento Children's Hospital; Queensland Mycobacterial Reference Laboratory; Child Health Research Centre, University of Queensland; School of Medicine (UQ); School of Chemistry and Biomolecular Sciences (UQ); and School of Public Health (UQ).

The **12th Annual Australia and New Zealand Aerosol Assembly (ANZAA) Workshop** was held on the 4th – 5th August 2016 at QUT in Brisbane, Australia. The purpose of the Australia and New Zealand Aerosol Assembly (ANZAA) workshops is to explore new developments and ongoing research on atmospheric particulates. They encourage informal discussion and networking between attendees. ANZAA meetings have been held annually since 2004, at various locations in Australia and New Zealand.

Professor Morawska is leading efforts of an international, multi-disciplinary centre of research, the '**Australia - China Centre for Air Quality Science and Management**' (ACC-AQSM). The aim of the ACC-AQSM is to provide a platform for joint research to further scientific understanding of the multidimensional problem of air pollution and its impact on human health and the environment, to provide technological and innovative solutions to the problem, and to provide input into national policies and thus enabling informed and efficient regularly management and control. **The Annual Meeting of the ACC-AQSM was held in Shanghai from the 20-22 October 2016.**

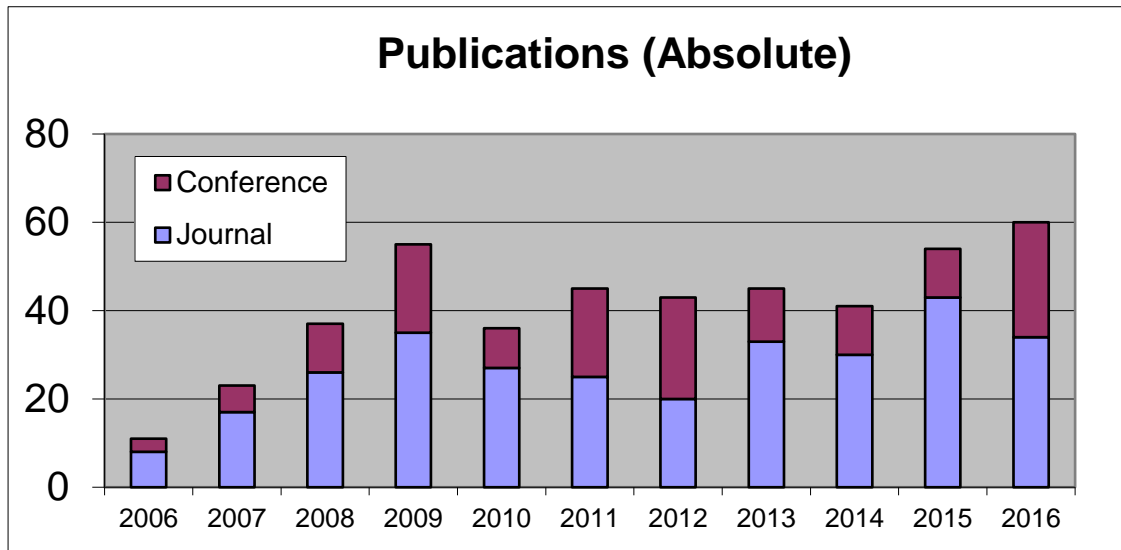
In 2016, a **Joint PhD Agreement** was also signed between the Lublin University of Technology, Poland, and the Queensland University of Technology, Australia.

Professor Ristovski, chef scientist on a voyage to examining the air above the **Great Barrier Reef**. He is leading a world-first study by an international collaboration of climate scientists from 13 institutions that have come together on the voyage to confirm that coral creates rain. For years, researchers have documented the increasing impact of climate change on the Great Barrier Reef, but very little is known about the reef's effect on the climate, particularly rainfall. This team is here to investigate whether a damaged or dying reef could have repercussion for weather patterns in north Queensland.

## **4. Awards and Achievements**

In, 2016, Dr Branka Miljevic was promoted to Senior Lecturer.

## 5. Peer Reviewed Publications



**Figure 1.** ILAQH Refereed Publications from 2006-2016.

## 6. Competitive Grants (Awarded)

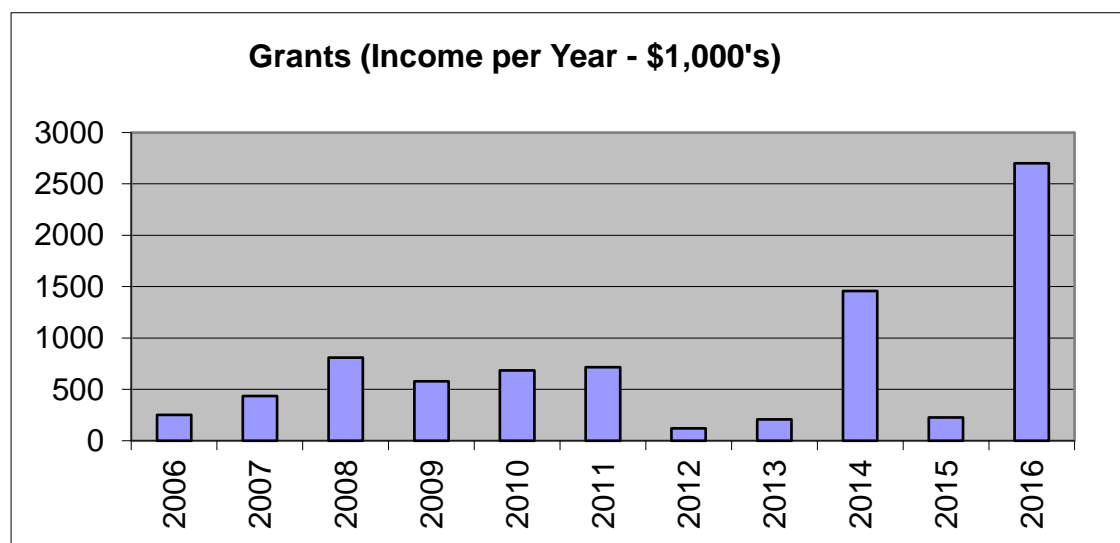


Figure 2. ILAQH Grant Income Distribution per Year (2006-2016)

*\*Please note that the table above does not include the grants that start in 2017 and does not include grants where funds are being managed externally to QUT (e.g. NSFC).*

### Australian Competitive Grants

**Project Scheme:** Australia Research Council Linkage Projects Grant 2017

**Chief Investigators:** Graham Johnson, Theodorus Sloots, Caroline Duchaine, Dr Julian Tang

**Awarded:** \$303,000

**Project Title:** Modulation of airconditioning settings to destroy respiratory viruses

**Project Scheme:** NHMRC Centres for Research Excellence 2016-2021

**Chief Investigators:** Guy Marks, Bin Jalaludin, Michael Abramson, Lidia Morawska, Shyamali Dharmage, Fay Johnston, Geoffrey Morgan, Jane Heyworth, Graeme Zosky, Yuming Guo

**Awarded:** \$2,491,229

**Project Title:** Energy transitions, air pollution and health in Australia (APP1116412)

**Project Scheme:** Australia Research Council Linkage Projects Grant 2016

**Chief Investigators:** Lidia Morawska, Kourosh Kalantar-zadeh, Nunzio Motta, Benjamin Mullins, Godwin Ayoko, Zoran Ristovski, Mandana Mazaheri, Samuel Clifford, Matthew Dunbabin, Phong Thai, Luis Gonzalez, Dian Tjondronegoro, Matthew Riley, Yvonne Scorgie, David Wainwright, Gavin Fisher, Kelvyn Steer, Elizabeth Ebert, Jiming HAO

**Awarded:** \$450,000

**Project Title:** Establishing advanced networks for air quality sensing and analysis



**Project Scheme:** CAR Seed Funding 2016  
**Chief Investigators:** Lidia Morawska  
**Awarded:** \$20,000  
**Project Title:** Application of low cost air pollution sensors for personal exposure monitoring

**Project Scheme:** Endeavour Research Fellowship 2016  
**Chief Investigators:** Branka Miljevic  
**Awarded:** \$18,000

**Project Scheme:** QUT's Women In Research Grant 2016  
**Chief Investigators:** Branka Miljevic  
**Awarded:** \$10,000

**Project Scheme:** IHBI Sponsorship Scheme 2016  
**Chief Investigators:** Lidia Morawska  
**Awarded:** \$1,500  
**Project Title:** Australia New Zealand Aerosol Assembly (ANZAA) Workshop

## **Foreign Competitive Grants**

**Project Scheme:** Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety 2016-2017  
**Chief Investigators:** Lidia Morawska and Tunga Salthammer  
**Awarded:** \$129,009  
**Project Title:** Smart Homes – how intelligent building management technologies contribute to the improvement of indoor air quality

**Project Scheme:** Asian Universities Cluster (AUC) Center of Excellence in Civil Engineering  
**Chief Investigators:** Hai Guo, Lidia Morawska, Rajasekhar Balasubramanian, Yingjun Chen  
**Awarded:** The funding amount includes HKD400,000 from HKPU, RMB500,000 from Tongji University, and AUD125,000 from QUT.  
**Project Title:** Impacts of Megacities on Regional Atmospheric Environment – A comparative study of emission, transformation and effects of urban pollution from Australia, Singapore, Shanghai, and Hong Kong.

**Project Scheme:** National Natural Science Foundation of China Young Scholar Grant 2017-2018  
**Chief Investigators:** Svetlana Stevanovic, Lina Wang  
**Awarded:** 400,000 RMB (~\$76,500 AUD)  
**Project Title:** Investigation on the role of aging, different aerosol fractions, different sources and different conditions on the formation of SOA and Chemical ROS in urban environments

**Project Scheme:** The National Natural Science Foundation of China 2016  
**Chief Investigators:** Jian GAO, YiSheng XU, Shuang DENG, Yingjie SHI, Kai LI, Yingze TIAN, Caiqing YAN, Miikka Ilmari Dal Maso, Lidia MORAWSKA, Zhisheng ZHANG  
**Awarded:** \$2,800,000 CNY (~\$560,000 AUD)  
**Project Title:** Identification and Evaluation of Key Impact Factors on the Multiple-Time-Resolution Particle Source Apportionment and Its Comprehensive Validation over Beijing-Tianjin-Hebei Region

**Project Scheme:** The National Natural Science Foundation of China 2016  
**Chief Investigators:** Boguang WANG, Linyan HE, Wei SONG, Hao WANG, Duohong CHEN, Lei ZHOU, Congrong HE, Peng CHENG, Yunpeng LI, Zhijuan ZHANG  
**Awarded:** \$3,240,000 CNY (~ \$650,000 AUD)  
**Project Title:** Concentrations and Compositions of Biogenic Volatile Organic Compounds in Forests of Heavy Photochemical Pollution Regions and Their Role in Secondary Pollutant Formation.

**Project Scheme:** Hong Kong Research Council Grant 2016  
**Chief Investigators:** Hai Guo, Lidia Morawska, Xiangdong Li, Chak Chan, Xinming Wang, Linwei Tian, Kin-Fei Ho, Man-Nin Chan, Zi Ning  
**Awarded:** \$8,520,000 HKD (~ \$1,500,000 AUD)  
**Project Title:** Thermal desorption aerosol gas chromatograph and time of flight aerosol mass spectrometer.

**Project Scheme:** National Research Grant: VET-TF of the Department of Motor Traffic Funded by the Vehicle Emission Testing Trust Fund (VET-TF) 2016  
**Chief Investigators:** Indrika Rajapaksha, Saroj Jayasinghe, Shreenika De Silva, Lidia Morawska  
**Awarded:** \$5,700,000 LKR (~ \$51,000 AUD)  
**Project Title:** Effect of transport related air pollution on respiratory illnesses of school children

## **7. Other Public Sector / New Consultancy Research Projects Commenced**

**Project Title:** In Provision of a method for assessing population exposure to long-term PM2.5

**Funded By:** Environment Protection Authority Victoria

**Awarded:** \$35,000

**Chief Investigators:** Lidia Morawska, Michael Brauer, Michael Hewson, Guy Marks, Yuming Guo, Phong Thai, Mandana Mazaheri, Samuel Clifford, Luke Knibbs, Bijan Yeganeh, Mahmudur Rahman

## 8. Collaboration with WHO

### Lidia Morawska

- Professor Morawska contributed to the preparation of the preparing the **'Regional Framework on Health and the Environment for the Western Pacific (2017-2021)'** for the WPRO office in Manila, Philippines in January 2016.
- Invited to attend the **'Expert Consultation on Air Quality and Health in the Eastern Mediterranean Region'** to be held from the 11-12 May 2016 in Amman, Jordan, but the meeting was postponed for a later date. Since, Professor Morawska has prepared material for the **Concept Note titled, 'What Individuals can do to minimize exposure to air pollution?; The role of Health Sector in Eastern Mediterranean Region in promoting air quality management intentions by other sectors.'** The work is continuing.
- Attended by invitation as an expert on air pollution, to participate in and co-chair the **1<sup>st</sup> Meeting of the Guideline Development Group for the update of the WHO Global Air Quality Guidelines**, which was held in Bonn, Germany from the 27-29 September 2016.

### Mandana Mazaheri

- Dr Mandana Mazaheri was invited by the World Health Organization (WHO) – European Centre for Environment and Health to contribute to tackling a real-world challenge on the role of green spaces in planning healthier cities. Mandana has been working with the WHO's Environmental and Exposures Risks team in Bonn, Germany since December 2015, towards developing a tool for quantifying urban green space impacts on air quality and health. Dr Mazaheri collaborated with the WHO in Bonn, Germany from the 4 June – 1 July 2016.

## 9. Conference Presentations (Keynote)

### Lidia Morawska

- Invited Keynote Presentation at the National Air Quality and Health meeting, held in Melbourne, Australia from the 15-16<sup>th</sup> February 2016. Presentation: *Personal Exposure Monitoring*
- Invited Keynote Presentation at the 4<sup>th</sup> Workplace and Indoor Aerosols Conference in Barcelona, Spain from the 20-22<sup>nd</sup> April 2016. Presentation: *Indoor air: will new technologies help to improve it?*
- Three invited Keynote Presentations at the Xi'an Jiaotong University, China from the 16-22 June 2016. Presentation 1: *Urban air of ancient Rome and contemporary Xi'an: are they different?* Presentation 2: *Indoor air: will new technologies help to improve them?* Presentation 3: *Exposure to air pollution and human health.*
- Invited Plenary Presentation at the SETAC-AR (Argentinean chapter of the Society for Environmental Toxicology and Chemistry), in Córdoba, Argentina from the 10-14<sup>th</sup> October 2016. Plenary Presentation: *Air pollution and its consequences to human health.* Course: *Aerosols: sources, characteristics, exposure and health impacts*
- Invited presentation at the second Annual Meeting of the ACC-AQSM held in Shanghai, China from the 20-22<sup>nd</sup> October 2016. Presentation: *WHO Air Quality Guidelines: past, present and their significance for China*
- Invited Plenary Presentation at the Emerging Sensing Technologies Summit, Melbourne, Australia, from the 7-9<sup>th</sup> December 2016. Presentation: *Will we be surrounded by sensors monitoring every molecule polluting our air?*

## **10. Presentations - Other**

- None to mention.

## 11. Activities – Other

### Lidia Morawska

- Guest Editor for the Special Issue titled “Air Quality in China: Current and Emerging Challenges” for the *Science of the Total Environment* Journal.
- Guest Editor for the Special Issue titled: “Indoor and Workplace air quality” for the *Science of the Total Environment* Journal.
- Guest Editor for the Special Issue titled "Regional transport and transformation of air pollution in eastern China" for the *Atmospheric Chemistry and Physics* Journal.

## 12. Media Appearances

### **Lidia Morawska**

Many media appearances / interviews, for example:

- Queensland Science making a difference video. The link:

<https://www.facebook.com/qldscience/photos/a.251660768229205.61868.205736396154976/849745518420724/?type=1&theater>

### **Zoran Ristovski**

- Great Barrier Reef Voyage: ABC News, 14 October 2016.

The link: <http://www.abc.net.au/news/2016-10-14/how-the-great-barrier-reef-coral-impacts-rainfall/7928714>

- Report on ABC published 29 Oct 2016 on the GBR campaign, titled “Australia Wide” and focused on young climate scientist. Two of ILAQH’s PhD students Luke Cravigan and Chieneriwo Godday Osuagwu were featured on the program. The link (available until Sat 12 November 2016):

<http://iview.abc.net.au/programs/australia-wide/NU1601H039S00#playing>



## 13. Visitors

- Professor Boguang Wang, *Deputy Director*, Institute of Atmospheric Environmental Safety and Pollution Control, *Visiting Research Academic*, Jinan University, Guangzhou, 15 July 2015 – 12 February 2016.
- Professor Wei Wang, *Visiting Research Academic*, Anhui Jianzhu University, China, 21 October 2015 – 4 November 2016.
- Ms Valeria Rizza, *Visiting Research Student*, University of Cassino, Italy, 1 September 2015 – 1 September 2016.
- Professor Tong Zhu, *Distinguished Visiting Research Academic*, Peking University, China, 25 January – 8 February 2016.
- Professor Hai Guo, *Visiting Research Academic*, Hong Kong Polytechnic University, 8 -12 February 2016.
- Ms Shokat Akbarnezhadnesheli, *Visiting Research Student*, Bahonar University of Kerman, Kerman, Iran, 20 January – 20 July 2016.
- Dr Barbara D'Anna, *Visiting Research Fellow*, University of Lyon, France, 4 February – 2 April 2016.
- Professor Chung-Shin Yuan, *Visiting Research Academic*, Director of the Institute of Environmental Engineering, National Sun Yat-Sen University (NSYSU), 29 February – 20 May 2016.
- Dr Dongfang Wang, *Visiting Researcher*, Shanghai Environmental Monitoring Centre, China, 17-18 May 2016.
- Mr Xiaohao Wang, *Visiting Researcher*, Shanghai Environmental Monitoring Centre, China, 17-18 May 2016.
- Ms Hanna Fragstein, *Visiting Undergraduate Student*, Fraunhofer Wilhelm-Klauditz-Institute (WKI), Germany, 4 April – 27 May 2016.
- Mr Aline Nguy, *Visiting Research Student*, Paris Descartes University, France, 15 April – 31 August 2016.
- Mr Adrian Mabon, *Visiting Research Student*, L'Ecole des Mines Albi-Carmaux, France, 2 May – 19 August 2016.
- Mr Robin Flament, *Visiting Research Student*, Mechanical Engineering Students at Mines Albi Engineering School, 1 May – 30 August 2016.
- Dr Barbara Bednarski, *Visiting Research Fellow*, University of Nantes, France, 1 June – 30 August 2016.
- Mr Antonio Pacitto, *Visiting Research Student*, University of Cassino, Italy, 9 June – 30 August 2016.
- Yueyue Chen and Xuejiao Wang (PKU), hosted by QUT, 19-25 August 2016.
- A/Prof Jing Shing (PKU), hosted by QUT, 19-25 August 2016.
- Professor Xin Yang, *Distinguished Visiting Academic*, Fudan University, China, 22-25 September 2016.

- Ms Jing Li and Ms Meizhen Zhang, Beijing Municipal Research Institute of Environmental Protection, 12 October 2016.