Dr William Bloss PhD

Reader in Atmospheric Science
Deputy Head of School

School of Geography, Earth and Environmental Sciences (/schools/gees/index.aspx)

Contact details

Telephone +44 (0)121 414 2558 (tel:+44 121 414 2558)

Fax +44 (0)121 414 3709

Email w.j.bloss@bham.ac.uk (mailto:w.j.bloss@bham.ac.uk)

Twitter @AtmosChemUoB (http://twitter.com/@AtmosChemUoB)

School of Geography, Earth and Environmental Sciences
University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK

About

Atmospheric processing controls the current and future composition of our atmosphere, and affects human and environmental health, air quality and climate. My research group addresses three areas of atmospheric chemistry central to these impacts :

- Measurement and interpretation of ozone production in the atmospheric boundary layer
- Sources and sinks for atmospheric oxidants: Impacts upon urban air quality and tropospheric composition
- The atmospheric chemistry of halogen species, in particular iodine chemistry in the marine boundary layer

Our work combines laboratory, large simulation chamber, field measurement and numerical modelling approaches; we currently have an emphasis upon developing new integrated approaches to assess *chemical processing* (a complement to the traditional focus upon *species abundance*). Our research delivers fundamental understanding of the atmospheric chemical system, in an applied context: providing knowledge to underpin policy developments to reduce air pollution.

Please see my **Personal Research Pages (http://www.atmos.bham.ac.uk/)** for more details.

Qualifications

- PhD Atmospheric Chemistry - University of Cambridge
- BA Natural Sciences (Chemistry) - University of Cambridge

Biography

Bill obtained his BA in Natural Sciences (Chemistry) and PhD in Atmospheric Chemistry from the University of Cambridge. His PhD research concerned laboratory studies of atmospheric chemical kinetics. In 1999 he took up a position as a Postdoctoral Scholar at the California Institute of Technology, based at the NASA Jet Propulsion Laboratory, studying the chlorine oxide reactions responsible for polar ozone hole formation. In 2001 Bill moved to the School of Chemistry at the University of Leeds, working initially as a Research Fellow and subsequently as a lecturer in Physical Chemistry, where his research involved field measurements of tropospheric radical species. He joined the University of Birmingham in 2007, where he is currently Reader in Atmospheric Sciences and Deputy Head of School.

Teaching

BSc Environmental Sciences

MSc Air Pollution Management and Control (/postgraduate/courses/taught/gees/air-pollution-mgt-ctrl.aspx)

Postgraduate supervision

PhD Project Opportunities are listed on the **School pages (/schools/gees/courses/postgraduate/phd-projects.aspx)**. Funding is available annually through the NERC **Central England Doctoral Training Partnership (CENTA) (/generic/centa/index.aspx)** for UK/EU students; **other sources of support (/postgraduate/dr-fees/index.aspx)** are also available – please contact me if you are interested in studying for a PhD with us.

Current PhD Students

- Tara Rasoul (PhD, 2014+): Urban Climate Effects on Air Pollution and Atmospheric Chemistry
- Daniel Blenkhorn (PhD, 2013+): Novel approaches to the measurement of atmospheric VOC mixtures using soft chemical-ionisation mass spectrometry - drift-tube techniques
- Ajit Singh (PhD, 2013+): Bioaerosol – Atmospheric Oxidant Interactions
- Mariam Al-Adba (PhD, 2013+): Air Quality under future Climate Scenarios
- Lubna Al-Saadi (PhD, 2013+): Source Apportionment of Particulate Matter in Doha, Qatar
- Jian Zhong (PhD, 2011+): Modelling Air Quality in Street Canyons
- Hao Huang (PhD, 2011+): In Situ Measurement of Ozone Production Rates

Completed PhD Students

- Suad Al-Kindi (PhD, 2009-2014): Artificial Chemical Ageing of Ambient Atmospheric Aerosol
- Vivien Bright (PhD, 2008-2012): Street Canyon Atmospheric Composition: Coupling Dynamics and Chemistry
- Kate Faloon (PhD, 2007-2010) : Development of a Laboratory System to Investigate the Interactions of Tropospheric Aerosol and HOx Radicals.
- Salim Alam (PhD, 2007-2010) : Total Radical Production and Degradation Products from Alkene Ozonolysis
- Lucy Concannon (MPhil, 2008-2009) : A Modelling Study of the Role of Iodine in the Coastal Marine Boundary Layer

Research

Bill's group currently comprises two Postdoctoral Research Fellows (Dr Mike Newland and Dr Leigh Crilley), alongside a number of PhD students (see above) and MSc / project students. We contribute to the Air Pollution and Atmospheric Chemistry theme of the **Environmental Health Sciences (/research/activity/environmental-health/index.aspx)** group at Birmingham.

Our work is supported by funding from RCUK (16 funded grants, 12 as lead PI, totalling >£3m), EU sources, the DFG, the Royal Society, the Royal Society of Chemistry and the Nuffield Foundation.

Research interests

Atmospheric Chemistry :

- Measurement and interpretation of ozone production in the atmospheric boundary layer
- Sources and sinks for atmospheric oxidants: Impacts upon urban air quality and tropospheric composition
- The atmospheric chemistry of halogen species, in particular iodine chemistry in the marine boundary layer

Measurement of Ozone Production Rates

Ozone is a critical air pollutant, harmful to human health, crops and vegetation, an important atmospheric reactant (precursor to the key radical oxidant OH), and a significant greenhouse gas. Understanding atmospheric ozone levels is therefore a key goal for atmospheric chemists, underpinning effective air quality policy measures. As ozone is a secondary pollutant, formed in the atmosphere from the complex processing of NOx and VOCs, predicting ozone levels is still a challenge for atmospheric models. We are developing an alternative approach to this problem, to directly measure the local chemical ozone production rate, as a complementary approach to model (and other observational) tools, and have made preliminary measurements in the UK and India (see news article). This work is funded by NERC and the Royal Society.

Alkene Ozonolysis: Radical Production and Criegee Chemistry

The gas-phase reaction between ozone and alkenes produces a range of products, including radical species such as OH, which are known to contribute to atmospheric processing, and newly detected species – stabilised criegee intermediates or SCIs – which may also drive atmospheric oxidation, for example converting SO2 to sulphate aerosol, affecting air quality and climate. In a series of projects, funded by NERC and the EU, we have investigated the radical and SCI production from the ozonolysis of a range of alkenes of biogenic and anthropogenic origin, and are now exploring their role as atmospheric oxidants for SO2 and NOx. We use the European Photoreactor (EUPHORE) large simulation chamber facility in Valencia, Spain, as our primary experimental tool, and interpret the data obtained using the MCM atmospheric model. This work is performed in collaboration with Andrew Rickard & Mat Evans (York), Luc Vereecken (MPI Mainz) and Marie Camredon (Paris / LISA).

Point Measurements of Iodine and Bromine in the Marine Boundary Layer

Iodine compounds released from the ocean cause a range of chemical effects in the marine atmosphere - they can influence atmospheric oxidant levels, participate in catalytic ozone destruction cycles, and potentially lead to the formation of new atmospheric particles, which may influence cloud formation and hence weather and climate. These natural processes are known to be important in certain coastal regions, but their significance over the open ocean, and hence overall global impact, is uncertain. We have developed a new instrument to measure halogen atoms, using the technique of Resonance Fluorescence, and applied this to measure iodine levels in the North Atlantic, in collaboration with Dwayne Heard (Leeds), and to perform simulation chamber studies of iodine chemistry in collaboration with Cornelius Zetzsch (Bayreuth) and Uli Platt (Heidelberg).

Other activities

- Royal Society of Chemistry: CChem, FRSC
- Vice-Chair of the RSC Environmental Chemistry Group (Chair, 2012 – 2014)
- Member, RSC Environment, Sustainability and Energy Division Council
- Member, NERC Core Peer Review College
- Associate Editor, Atmospheric Science Letters
- External Examiner, MRes Climate & Atmospheric Science, University of Leeds

Publications

Selected Publications

Over 50 international peer-reviewed journal articles (h-index = 23 [Web of Science]) and 8 chapters / contributions to edited works.

L.R. Crilley, **W.J. Bloss** et al. (2015) Sources and Contributions of Wood Smoke During Winter in London: Assessing Local and Regional Influences. Atmos. Chem. Phys., in press, 2015

M.J. Newland, A.R. Rickard, M.S. Alam, L. Vereecken, A. Muñoz, M. Ródenas & **W.J. Bloss** (2015) Kinetics of stabilised Criegee intermediates derived from alkene ozonolysis: reactions with SO2, H2O and decomposition under boundary layer conditions. Phys. Chem. Chem. Phys., 17, 4076-4088.

J. Zhong, X.-M. Cai & **W. J. Bloss** (2014) Modelling segregation effects of heterogeneous emissions on ozone levels in idealised urban street canyons: using photochemical box models. Environ. Polln., 188, 132-143

M.S. Alam, A. R. Rickard, M. Camredon, K. P. Wyche, T. Carr, K. E. Hornsby, P. S. Monks & **W. J. Bloss** (2013) Radical Product Yields from the Ozonolysis of Short Chain Alkenes under Atmospheric Boundary Layer Conditions. J. Phys. Chem. A, 117, 12468-12483

B. Ouyang, M. W. McLeod, R. L. Jones & **W. J. Bloss** (2013) NO3 radical production from the reaction between the Criegee intermediate CH2OO and NO2, Phys. Chem. Chem. Phys. 15, 17070-17075

R. Sommariva, **W.J. Bloss** & R. von Glasow (2012) Uncertainties in Gas-Phase Iodine Chemistry, Atmos. Environ. 57, 219-232.

M. S. Alam, M. Camredon, A. R. Rickard, T. Carr, K. P. Wyche, K. Hornsby, P. S. Monks and **W. J. Bloss** (2011) Total Radical Yields from Tropospheric Ethene Ozonolysis, Phys. Chem. Chem. Phys., 13, 11002-11015.

W.J. Bloss, M. Camredon, J. D. Lee, D. E. Heard, J. M. C. Plane, A. Saiz-Lopez, S. J.-B. Bauguitte, R. A. Salmon, and A. E. Jones (2010) Coupling of HOx, NOx and halogen chemistry in the Antarctic boundary layer, Atmos. Chem. Phys., 10, 10187-10209.

A. K. Mollner, L. Feng, M. K. Sprague, M. Okumura, D. B. Milligan, **W. J. Bloss**, S. P. Sander, P. T. Martien, R. A. Harley, A. B. McCoy and W.P. Carter (2010) Rate of gas phase association of hydroxyl radical and nitrogen dioxide, Science, 330, 646-649.

M. Camredon, J. F. Hamilton, M. S. Alam, K. P. Wyche, T. Carr, I. R. White, P. S. Monks, A. R. Rickard, and **W. J. Bloss** (2010) Distribution of gaseous and particulate organic composition during dark α-pinene ozonolysis, Atmos. Chem. Phys. 10, 2893-2917.

C.S.E. Bale, T. Ingham, R. Commane, D.E. Heard and **W.J. Bloss** (2008) Novel Measurements of atmospheric iodine species by resonance fluorescence, J. Atmos. Chem. 60, 51-70.

Privacy | Legal | Cookies and cookie policy | Accessibility | Site map | Website feedback | Charitable information

© University of Birmingham 2015