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About

David is staff member of the National Center of Atmospheric Sciences (NCAS) working at Birmingham University. His interests are in the research and development of scientific instrumentation, novel multivariate data analysis algorithms and atmospheric modelling tools used for the interpretation of data collected from atmospheric aerosols.

Qualifications

- MPhys
- CPhys
- MInstP
- PhD

Biography

- Research Officer, Department of Physics, University of Wales Swansea. 2001-2006
- Honorary Research Fellow, DEHRM, University of Birmingham. 2001-2006
- Research Fellow, DEHRM, University of Birmingham. 2000-2001
- Research Fellow, DEHRM, University of Birmingham. 2006-2009

Research

Research group

- **Environmental health sciences (/research/activity/environmental-health/index.aspx)**

Research interests

- Airborne Particulate Matter, including data analysis using novel statistical and chemometric methods
- Analytical Laser Spectroscopy, including Laser Induced Breakdown Spectroscopy (and/or Laser Induced Fluorescence Spectroscopy), Aerosol Time-of-Flight Mass Spectroscopy, and general instrument research and development
- Fundamental Physics, including Lasers Spectroscopy of Positronium and Muonium

Current / recent research

Current research interests include the understanding of atmospheric aerosol measurements using novel multivariate data analysis methods and the developing of data processing techniques.

Recent highlights include:

- (i) the development of an enhanced algorithm to merge datasets collected by collocated particle size instruments (SMPS+APS) measuring particle sizes across the complete particle size spectrum.
- (ii) the analysis of particle size data using Positive Matrix Factorisation to extract trends in the data and link the observations in the aforementioned 'merged' data to sources and formation processes (e.g. to traffic counts and meteorological);
- (iii) the enhancement of a UK Photochemical Trajectory model for the assessment of the contribution to PM10 measurements from chloride, nitrate and sulphate; and
- (iv) the assessment of policy relevant NH3, NOX and SO2 abatement scenarios on the contribution to PM10 measurements from chloride, nitrate and sulphate using the enhanced UK PTM.

Past research has focussed on the development, design and deployment of analytical laser systems to carry out measurements within the laboratory, within industry, and during atmospheric monitoring campaigns, e.g:

- (i). Laser Spectroscopy of Positronium and Muonium generated respectively at the Swansea University's Positron beam Facility and Rutherford Appleton's muonium facility ISIS;
- (ii) Qualitative and quantitative analysis of materials with only optical access at BNFL and British Steels; and

- (iii) Single Particle Mass Spectrometry of atmospheric particles measured during campaigns at observatories at Harwell (Oxford), Barcelona, Bologna, Mace Head, Birmingham and London including engine- and tyre-dynamometer studies.

Publications

Key Publications since 2001

Asmi A., A. Wiedensohler, P. Laj, A.M. Fjaeraa, K. Sellegri, W. Birmili, E. Weingartner, U. Baltensperger, V. Zdimal, N. Zikova, J.P. Putaud, A. Marinoni, P. Tunved, H.C. Hansson, M. Fiebig, N. Kivekas, H. Lihavainen, E. Asmi, V. Ulevicius, P.P. Aalto, E. Swietlicki, A. Kristensson, N. Mihalopoulos, N. Kalivitis, I. Kalapov, G. Kiss, G. Deleeuw, B. Henzing, R.M. Harrison, **D. Beddows**, C. O'Dowd, H. Flentje, K.Weinhold, F. Meinhardt, L. Ries, and M. Kulmala. Number Size Distributions and seasonality of Submicron Particles in Europe 2008–2009, Atmos. Chem. Phys., 11, 5505–5538 (2011).

Beddows, DCS, Dall'osto, M, Harrison, RM (2010) An Enhanced Procedure for the Merging of Atmospheric Particle Size Distribution Data Measured Using Electrical Mobility and Time-of-Flight Analysers, Aerosol Sci. & Technol, 44, 11, 930-938

Wiedensohler, A, W. Birmili, A. Nowak, A. Sonntag, K. Weinhold, M. Merkel, B. Wehner, T. Tuch, S. Pfeifer, M. Fiebig, A. M. Fjäraa, E. Asmi, K. Sellegri, R. Depuy, H. Venzac, P. Villani, P. Laj, P. Aalto, J. A. Ogren, E. Swietlicki, P. Roldin, P. Williams, P. Quincey, C. Hüglin, R. Fierz-Schmidhauser, M. Gysel, E. Weingartner, F. Riccobono, S. Santos, C. Grüning, K. Faloon, **D. Beddows**, R. M. Harrison, C. Monahan, S. G. Jennings, C. D. O'Dowd, A. Marinoni, H.-G. Horn, L. Keck, J. Jiang, J. Scheckman, P. H. McMurry, Z. Deng, C. S. Zhao, M. Moerman, B. Henzing, and G. de Leeuw, (2010), Particle Mobility Size Spectrometers: Harmonization of Technical Standards and Data Structure to Facilitate High Quality Long-Term Observations of Atmospheric Particle Number Size Distributions Atmos. Meas. Tech. Discuss., 3, 5521-5587.

Harrison R.M., C. Giorio, **D.C. Beddows** and M. Dall'Osto, (2010), Size Distribution of Airborne Particles Controls Outcomes of Epidemiological Studies Sci.Total Environ., 409, 289-293.

M. Dall'Osto, A. Thorpe, **D.C.S. Beddows** and R.M. Harrison, Remarkable Dynamics of Nanoparticles in the Urban Atmosphere, Atmos. Chem. Phys. Discuss., 30651-30689 (2010).

Godri, KJ, Green, DC, Fuller, GW, Dall'Osto, M, **Beddows, DC**, Kelly, FJ, Harrison, RM, Mudway, IS, (2010) Particulate Oxidative Burden Associated with Firework Activity, Environ. Sci. Technol, 44, 21, 8295-8301

Harrison, RM, Giorio, C, **Beddows, DCS**, Dall'Osto, M (2010), Size distribution of airborne particles controls outcome of epidemiological studies, Sci. of the Total Env., 409, 2, 289-293

Beddows, DCS, Dall'Osto, M, Harrison, RM, (2009) Cluster Analysis of Rural, Urban, and Curbside Atmospheric Particle Size Data, Environ. Sci. Techno , 43, 13, 4694-4700

Baker, C., Van der Werf, D., **Beddows, D.**, Watkeys, P., Isaac, C., Kerrigan, S., Charlton, M. and Telle, H. (2008) Weakly bound positron–electron pairs in a strong magnetic field, *J. Phys. B: At. Mol. Opt. Phys.* 41, 245003

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Dall'Osto, M., Harriso,n R., **Beddows, D.**, Freney, E., Heal, M. and Donovan, R., (2006) Single-particle detection efficiencies of aerosol time-of-flight mass spectrometry during the North Atlantic marine boundary layer experiment. *Environ Sci Technol.* (16):5029-35 16955903

Clarke J., Van Der Werf D., Griffiths B., **Beddows D**., Charlton M., Telle. H. (2006) Design and Operation of a Two-Stage Positron Accumulator, *Review of Scientific Instruments* 77, 063302 2006.

Heard, D.E., Read, K.A., Al-Haider, S., Bloss, W.J., Johnson, G.P., Pilling, M.J., Rickard, A., Seakins, P.W., Smith, S.C., Sommariva, R., Stanton, J.C., Still, T., Brooks, B., Jackson, A.V., McQuaid, J.B., Morgan, R., Smith, M.H., Carpenter, L.J., Carslaw, N., Hamilton, J., Hopkins, J.R., Lee, J.D., Lewis, A.C., Purvis, R.M., Wevill, D.J., Brough, N., Green, T., Mills, G., Penkett, S.A., Plane, J.M.C., Saiz-Lopez, A., Worton, D., Monks, P.S., Fleming, Z., Alfarra, M., Allan, J.D., Bower, K., Coe, H., Cubison, M., Flynn, M., McFiggans,G., Gallagher, M., Norton, E.G., Shillito, J., Topping, D., Vaughan, G., Williams, P., Bitter, M., Ball, S.M., Jones, R.L., Povey, I.M., O'Doherty, S., Noone, C., Simmonds, P.G., Allen, A., Kinnersley, R., **Beddows, D.,** Dall'Osto, M., Harrison, R.M., Donovan, R., Heal, M., Methven, J., Jennings, G. and Spain, G. (2005) The North Atlantic Marine Boundary Layer Experiment (NAMBLEX). Overview of the campaign held at Mace Head, Ireland, in summer 2002, *Atmos. Chem. Phys.,* 5, 12177-12254 (2005). SRef-ID: 1680-7375/acpd/2005-5-12177

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Dall'Osto, M., **Beddows, D. C. S**., Kinnersley, R. P., Harrison, R. M., Donovan, R. J. and Heal, M. R. (2004) Characterisation of individual airborne particles by using aerosol time-of-flight mass spectrometry (ATOFMS) Mace Head, Ireland, *J. Geophys. Res.* 109, D21302

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