A New Tool to Quantify Air Pollution Detrimental to Health and Food Security in Rapidly Urbanising Cities

The overall aim of this PhD project is to constrain pollution sources and examine temporal and spatial variability of air pollution in and around rapidly urbanising cities using satellite observations of air pollutants, interpreted with a chemical transport model.

Air pollution has adverse effects on public health and food security. Fine particles ($PM_{2.5}$) are breathed deep into lungs and ozone is a powerful oxidant harmful to humans and crops. Cities in developing countries are expanding rapidly due to unprecedented rates of urbanisation. This inevitably leads to a surge in unregulated anthropogenic emissions that go on to form ozone and $PM_{2.5}$. Many cities lack the resources to maintain an extensive air quality monitoring network, so little is known of the sources, evolution, and chemical fate of these pollutants. This limits the ability to develop effective environmental policy to mitigate air pollution. Satellite observations provide daily coverage of the Earth's atmosphere at relatively high spatial resolution (~25 km) and so offer a unique opportunity to circumvent the lack of ground-based air quality monitoring.

The successful PhD candidate will use satellite observations of air pollutants, interpreted with a chemical transport model, to constrain pollution sources and assess temporal and spatial variability of air pollution in and around cities. The first city to be studied is Birmingham (UK), as there are long-term ground-based observations and peer-reviewed publications to independently evaluate air pollution dynamics derived from satellite and model data. The methodology developed and validated for Birmingham will then be applied to cities where very limited surface observations suggest that air pollution routinely exceeds levels safe for public health. These include Delhi (India), Kathmandu (Nepal), Ontisha (Nigeria), São Paulo (Brazil), Jakarta (Indonesia), and Johannesburg-Pretoria (South Africa).

The Doctoral Researcher will be supervised by Dr Eloise Marais and Prof William Bloss, and will join a dynamic group of over 40 postdoctoral researchers and PhD students in the atmospheric science / air quality research team at Birmingham.

This project is fully-funded by the University of Birmingham's Global Challenges PhD Scholarship which includes full payment of tuition fees of £4,195 annually and an annual maintenance doctoral stipend at £14,553.

Applications will be reviewed as they are received, with a final deadline of 28 April 2017. The studentship will start in October 2017.

Additional application details are here: http://www.birmingham.ac.uk/postgraduate/pgr/global-challenges-scholarship.aspx

Prospective applicants are encouraged to contact Dr Marais (e.a.marais@bham.ac.uk) or Prof Bloss (w.j.bloss@bham.ac.uk) for informal discussions and queries.

Additional links:
Dr Marais profile: http://www.birmingham.ac.uk/staff/profiles/gees/marais-eloise.aspx
Prof Bloss profile: http://www.birmingham.ac.uk/staff/profiles/gees/bloss-william.aspx
University Air Pollution Research Theme:
http://www.birmingham.ac.uk/research/activity/environmental-health/areas/atmospheric/index.aspx