

NERC 4-year Fully-funded PhD studentship: Developing a new chemical link between composition, abundance, and sources of atmospheric black carbon in a major urban environment

Supervisors: Dr. Philippa Ascough (Scottish Universities Environmental Research Centre), Dr. Mat Heal (University of Edinburgh), Dr. Jaime Toney (University of Glasgow), Mr. Jim Mills (Director, Air Monitors Ltd)

Start date: September 2017

Rationale:

Air pollution is a persistent problem in the UK today, resulting in an estimated 40,000 deaths every year across the country. Pollution and its effects are greatest in our large urban centres, including cities such as London, Birmingham and Glasgow, where poor air quality has featured for over a century. This project focuses on one of the most poorly-understood fractions of air pollution, known as Black Carbon (BC). This material is the carbon-rich, highly condensed, particulate matter from biomass and fossil fuel burning, also known as soot, char and charcoal. Our lack of knowledge stems firstly from serious problems in reliably isolating, quantifying, and chemically investigating this major air pollutant. Secondly, there is a lack of systematic studies linking atmospheric BC dynamics with its deposition in environmental records such as soils. In this project, the student will apply novel analytical techniques and approaches allowing them to reliably isolate BC on a secure chemical basis for the first time. In this way, they will probe the source, abundance and fate of contemporary and historic BC pollution across the city of Glasgow in aerosol and soil samples. The project outcomes will include an entirely new understanding of the lifecycle of urban BC over short, medium, and long timescales, which can be applied to air pollution mitigation measures. As part of this work, the student will collaborate with Air Monitors Ltd, who lead the way in private sector BC research. This project component will provide access to state-of-the-art aerosol sampling and training opportunities. On completion of the Ph.D. the successful candidate will be well trained in a very topical academic research area and will have invaluable experience of interacting with various stakeholders including policy makers.

Approach:

Year 1: Analytical training; Develop & initiate sampling strategy; 2 months CASE placement; Analysis of standards & end member samples

Year 2: Aerosol & soil sampling & analysis; 2 months CASE placement;

Year 3: Sampling & analysis continues (including modeling of pollution maps); 2 months CASE placement; Initial data analysis & paper preparation

Year 4: Aerosol & soil sampling & analysis finalised; Intensive data interpretation; Paper preparation; Thesis write up.

Funding details: The studentship will pay the Research Council minimum stipend per year (currently £14,296) for four years, with fees fully covered as per NERC studentship regulations. The funding is applicable for UK nationals, EU nationals who have spent 3 years previously in the UK and foreign nationals with indefinite leave to remain in the UK.

About you: We are seeking dynamic candidates, able to function across disciplines, but with an understanding of Earth system processes / environmental chemistry (knowledge of the atmospheric C cycle would be useful). Enthusiasm for field and laboratory work is essential, along with sound laboratory skills. Applicants should hold a minimum of a UK Honours Degree at 2:1 level or equivalent in a relevant subject.

Your skill-development: In addition to the project specific skills that will leave you well-placed for a career as a research scientist, you will be expected to take part in the University of Glasgow's extensive programmed of transferable skill training development. This combination will ensure that the doctoral training you receive has balance between subject specific research skills and broader skills that employers seek, and that you are prepared for a diverse range of career options.

About us: The student will be based in the Scottish Universities Environmental Research Centre (SUERC; University of Glasgow) and will join a vibrant community of PhD researchers, postdoctoral and academic staff. They will also join the Glasgow College of Science and Engineering Graduate School, a thriving post-graduate research community. SUERC is a research-intensive center, with an excellent portfolio of analytical instrumentation available for use in the project. The supervisory team is drawn from researchers in the College of Science and Engineering in the Universities of Glasgow and Edinburgh. Dr. Philippa Ascough leads the NERC Radiocarbon Facility at SUERC, comprising four post-doctoral researchers and four technical staff, all researching aspects of the global carbon cycle and active in knowledge exchange. Dr. Mat Heal is an expert in atmospheric and environmental chemistry, with extensive experience in sampling and analysis of atmospheric pollutants. Dr. Jaime Toney leads the BECS research group at the University of Glasgow, comprising post-doctoral researchers, technical staff and postgraduate students. Jaime is an expert in analytical approaches to extracting and characterizing biomarkers such as polycyclic aromatic hydrocarbons from biomass burning. Mr. Jim Mills is director of Air Monitors Ltd., who have developed cutting-edge techniques for collection and qualitative/ quantitative assessment of atmospheric pollution in urban environments.

How to apply: In the first instance please contact Dr. Philippa Ascough to discuss your interest in the project, providing a c.v. with relevant skills and experience: Philippa.ascough@glasgow.ac.uk. Philippa will then advise on formal application as appropriate. The deadline for applications is