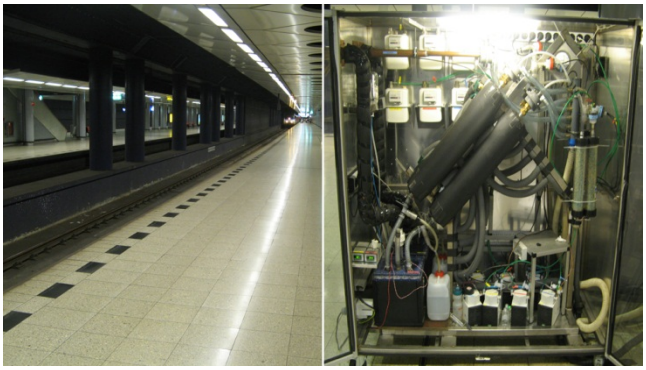
Geochemistry

UNIVERSITY OF Southampton

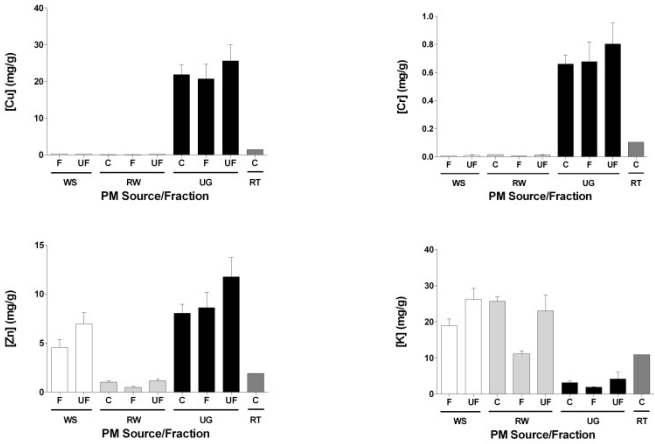
Geochemistry and health.

Background

Asthma is a common chronic inflammatory disease and recent studies show that atmospheric particles are important triggering factors for asthma. Some particles are naturally present in the environment (e.g. dust storms & volcanic ash), but there are also many sources of man-made particles in the atmosphere that have a variety of sources (e.g. combustion engines & mechanical wear) and compositions (e.g. organic matter & metal oxides). In a joint project between the Faculty of Medicine and the Geochemistry Group we are examining the link between particulate composition and health.



Particles being collected at Schiphol underground station



Concentrations of Cu, Cr, Zn, and K in particulate matter of coarse (C), fine (F), and ultrafine (UF) fractions collected from a woodstove (WS), roadwear generator (RW), underground station (UG), and road tunnel (RT). All analyses by ICP-MS.

Preliminary Study

We measured the composition of atmospheric particulates (PM) collected at a mainline underground railway station. . The results show that underground PM contains a high concentration of Fe and other metals compared to PM from other sources. Crucially, ultrafine underground dust was as rich in metals as coarse and fine underground PM, which may have important implications for underground PM toxicity, and warrants further study of the hitherto neglected ultrafine fraction in particular.

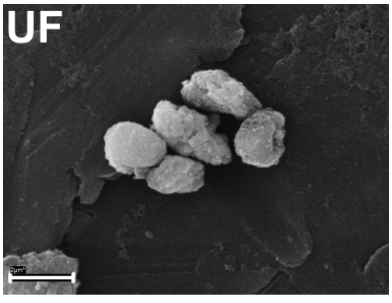
Personnel

This work forms the basis of the PhD study of Matt Loxham and is led by Professor Donna Davies & Dr Chris Grainge (Medicine) and Professors Damon Teagle & Martin Palmer (SOES).

Further Work

We have received funding to extend this study to examine the health effects and the chemical composition of dust generated in areas of intensive ship movements and in desert environments.

Previously we have also had projects studying the dissemination around the body of metals released from prosthetic devices, such as hip implants, and we are interested in widening our portfolio of health-related studies.



Morphology of ultrafine particles from under-ground station (scale bar 2μm)

Links

Inflamation Science – Faculty of Medicine

Key Contacts: Prof. Martin Palmer