Air quality

"The air that I breathe . . ."

A new role for the BGS in environment and air quality

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Three of the major aspects of our environment that impact on our health and well-being are the land that we live on, the water we drink, and the air that we breathe. While the BGS has been traditionally associated with surveying the land and has been involved in water quality research for many years, it has most recently become involved in issues of air quality and, in particular, the interaction of land use and the atmospheric environment.

In school we all learn that the air is made up of a number of gases such as nitrogen, oxygen or carbon dioxide. During the 1970s, concern about air pollution and acid rain issues drew attention to gases such as sulphur dioxide and nitrogen oxides. In the past decade the news has been full of information about the role minor gases such as methane and CFCs may have in global warming. However, the air also contains huge numbers of microscopic solid particles derived either naturally from the land or from man's activities. Although the quantity of particles in the air resulting from coal burning is less than it was in the past, the increase in numbers of vehicles, the rise of new industries, and our reuse of old industrial sites in cities have contributed new sources of airborne pollutants, bringing with them new problems and challenges.

Sampling airborne particulates using deposition gauges in Swansea.

As part of an ambitious new environmental science programme, the BGS has initiated a project: Monitoring Element and Particle Pathways in the Urban Environment. This will develop our investigative capabilities and improve our understanding of how our solid environment, the geosphere, interacts with our atmospheric and aquatic environments, particularly the urban–industrial environment in which most of us live.

The monitoring of industrial and vehicle-exhaust gas particulates in the urban environment, especially the respirable fraction PM10 (i.e. particles less than 10 microns in diameter), is well established. However, the role of particles on all scales (millimetre to sub-micron) in the transport of contaminants from point sources to the regional environment may be significant when aerial, aqueous, and re-suspension pathways are considered. The final fate of such material once settled and incorporated into urban soils and surfaces is poorly understood. In particular, the chemical and physical changes of the particles with time can change mobility, availability and toxicity of the contaminants they carry.

In association with the City and County of Swansea Council, the BGS has set up a series of deposition gauges across Swansea and the surrounding countryside. These devices collect both rainwater and the particles which fall, or are washed, out of the air. In the laboratory these can be filtered to separate the water from the particles. The elements or the sulphur isotopes dissolved in the rainwater can then be used to look at the influence of natural sources, such as sea water spray, or anthropogenic sources, such as industry or road traffic. In the case of the particles we will not only investigate their chemistry but also their mineralogy and physical form using instrumentation such as scanning electron microscopy. By integrating these techniques we are developing powerful tools to distinguish natural from anthropogenic sources for these troublesome particles.

The BGS would like to thank the City and County of Swansea Council for their continued interest and support for this project.

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