

Natural and anthropogenic soil geochemistry characteristics of Belfast, Glasgow, Cardiff and East London, in the UK.

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The British Geological Survey's Geochemical Baseline Survey of the Environment (G-BASE) project is responsible for the systematic geochemical mapping of the land surface of Great Britain. Samples of soils, stream sediments and stream waters collected at an average density of 1 sample per 1.5 km² are determined for up to 46 elements/parameters. Concerns over land quality in population centres have raised interest in the concentrations and behaviour of chemical substances within the urban environment. This prompted the G-BASE project to expand the geochemical survey into urban areas. The sampling strategy of urban areas differs to that of the regional survey as only soil samples are collected, but at a much higher density of 4 samples per km². Top (5 - 20 cm) and deeper (35 – 50 cm) samples are collected at each site. 22 urban centres from different parts of the UK have been surveyed so far, giving an extensive dataset of over 16000 samples. This provides a unique picture of the status of UK urban soil chemistry.

In this study, various data analysis techniques have been used to identify the main features of urban soil geochemistry in Belfast, Glasgow, Cardiff and East London. One apparent outcome of the study so far is that there are similarities between all urban centres, such as elevated levels of contaminants such as Pb and Zn in comparison with the regional background. All four of the cities have a significant industrial past and the data indicate a legacy of soil contamination. For example, Glasgow housed a large chromium ore production plant which left the south-east of the city with extremely elevated concentrations of Cr. However, the concentrations of other contaminants, such as As and Cd are lower than might be expected given the extent and duration of the city's industrial heritage. This is also true of Belfast where the distribution of environmentally sensitive elements is most strongly influenced by the underlying parent material. Notably high concentrations of Cr, Ni and Cu are controlled by the presence of the Antrim Basalts. In contrast, in Cardiff, the long industrial history, is reflected in elevated concentrations of several contaminants, some of which (Zn and Sn) are amongst the highest observed so far in the 22 urban areas. The latest urban data available are for the region of East London; the precursor to a major sampling effort that will take place in 2008 and 2009 to complete the survey of London.