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GEMAS: Natural and manmade signatures in Irish soils, potential applications for the GEMAS data

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Geochemical surveys have been conducted on Irish soils at a variety of scales over the last decade or so. Surveys of low density at a national scale (one sample per 500 km2), regional TELLUS surveys of an intermediate scale (one sample per 2-4 km2) and urban surveys of high density (4 samples per 1 km2) have been carried out across various parts of the country. Interpretation of these survey data has focused on identifying both the natural (geogenic) and the additional man-made signatures that control the spatial distribution of elements.

It is clear from GEMAS data that geological domains and climatic processes can be readily identified from an extremely low density survey at a continental scale. However, manmade inputs from polluting or contaminating industries, from diffuse pollution or agricultural practices are largely undetected at that scale. Higher density surveys are often considered necessary to understand these signatures better and to constrain the spatial patterns and extent of such sources.

In an extensively glaciated terrain such as Ireland, the soil composition is primarily controlled by the soil parent material and the local bedrock geology; however human influence - either through diffuse pollution or agricultural practice - may bear an additional signature which can be revealed through the careful examination of the data at differing scales.

The distribution of Zn, Pb, Cd, As, Hg and other elements show contributions from both natural and anthropogenic inputs which are revealed differently by surveys at different scales. These are controlled by various combinations of zones of mineralisation, legacy mine sites, urban contamination or agricultural land uses.

The effects of urbanisation are detectable across the range of datasets, and the impact of diffuse pollution in a generally non-industrialised landscape can still be detected at the regional to national scale. The use of urban soil data can help in understanding and quantifying the fine line between what is natural and what is man-made.