Urban Geochemistry: from 2D to 3D

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The main need of city planners in relation to the geochemical quality of soils and subsoils is to have reasonable and representative visualisation of the data in a form, which enables them to be used effectively, and in an integrated way with other datasets (socio-economic, health, etc.).

The Working Group on geochemistry of the COST Action Tu1206 (Sub-Urban) focused on near surface soils, and deeper subsoils, particularly at the quarter or city scale. It supplements the recent Urban Geochemical Mapping Manual by Demetriades and Birke with contributions from the EuroGeoSurveys Geochemical Expert Group (published in 2015) that details good practice in 2D data acquisition of topsoil.

The current state of knowledge in relation to soil geochemistry (when available) is overwhelmingly based on surface (topsoil) and very near surface sampling of subsoils. This is expressed in the form of 2D mapping, based on interpolation between sample sites. 2D topsoil acquisition is particularly well suited for addressing health issues; deeper acquisitions are needed in relation to urban (re)development, construction work and remediation of contamination. 3D geochemical knowledge, although as yet uncommon, could be very useful in optimizing urban redevelopment projects, anticipating contamination problems, and managing excavated materials (e.g. local reuse possibilities, disposal costs etc.). Because all of these aspects can have important economic, environmental and social consequences, they are considered essential for urban sustainable development. To meet these future 3D and potentially even 4D (temporal and predictive) needs, improved development of data acquisition, management, visualisation and use of these are crucial steps.

Some examples of good practice, or at least of best efforts, are illustrated by case studies. For instance, the Vienna (Austria) and Glasgow (UK) case studies illustrate urban geochemical sampling surveys. The examples of Nantes and of the French BDSolU (Base de données sur les Sols Urbains - French national database on urban soils), may be referred to as good efforts with respect to 3D geochemical databases. The example of Nantes is also suggested as an example of best effort in terms of use of 3D urban geochemical data.

Identified gaps that currently exist include the development of 3D and 4D mapping technology, geochemical data acquisition and management, and 3D representation and use of geochemical data.