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Mapping the geochemistry of the Earth's surface at global to local scales

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Systematic geochemical mapping is considered to be the best available method to document changes in the levels of chemical elements in materials occurring at or below the Earth's surface, such as rock, soil, floodplain or overbank sediment, stream sediment, stream water, ground water and vegetation.

Geochemical maps are the principal means of presenting the spatial distribution of chemical elements and compounds in the aforementioned sample media. Geochemical mapping is performed at different sample densities and map scales depending on the objectives of the project, and the end product is always the interpretation of the spatial variation of chemical elements and compounds.

In global- or continental-scale geochemical mapping surveys, the interest is the delineation of large-scale patterns, and the sampling density used in different projects varies from 1 sample site/1600 km² in the North American Soil Geochemical Landscapes Project of the United States of America [1] to 1 sample site/4600 km² in the Geochemical Atlas of Europe [2], to 1 sample site/5200 km² in the National Geochemical Survey of Australia [3], and to 1 sample site/8300 km² in the Environmental Geochemical Monitoring Network of China [4]. In regional-scale geochemical mapping surveys, the objective is to delineate regional-scale patterns, and the sampling density varies from 1 to 2 samples/km² to 1 sample/10–25 km². In local-scale geochemical surveys the sample density increases considerably, i.e., from 5 samples/km² to thousands of samples/km². However, the sampling density in some local-scale projects does not adhere to any strict rules, as the decision depends on the objectives of the project and available funds.

The 3rd Arthur Darnley Symposium is devoted to “Mapping the geochemistry of the Earth's surface at global to local scales”. This is to emphasise the importance of scale in geochemical mapping. Who is Arthur G. Darnley? Arthur was the first chairperson of two successful IGCP projects, 259 International Geochemical Mapping and 360 Global Geochemical Baselines. The final report of IGCP 259 [5], published in 1995, was the most successful ever published by UNESCO. Although the report is concerned with global-scale geochemical mapping, it has illustrations showing the spatial distribution of a chemical element at different scales, from a mineral grain to a continent. We encourage you to study it [5]. The IUGS/IAGC Task Group on Global Geochemical Baselines decided from 2008 to honour Arthur for his foresight in establishing global-scale geochemistry with a symposium every four years at the International Geological Congress.

References:

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http://www.globalgeochemicalbaselines.eu/wp-content/uploads/2012/07/Blue_Book_GGD_IGCP259.pdf.

