

The Geochemical Atlas of Europe

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Chemical elements are the basis of all life on earth. The documentation of the regional distribution and variation of all chemical elements at the Earth's surface in a variety of different sample materials is of importance for understanding plant and animal health and productivity and last but not least to identify possible threats to human health as early as possible (e.g. from too high or too low natural concentrations of elements like As, F, I, Mo, Rn, Se, U). The Geochemical Atlas of Europe shows the distribution of a wide selection of chemical elements and compounds in soils, stream sediments and water at the European Scale.

Some of the most important results are:

- Natural element concentrations in the different sample materials vary by up to 4 orders of magnitude on the European scale; most elements show much lower concentrations in northern than in southern Europe.
- Large scale geochemical patterns emerge, many unexpected, and most of these are caused by a combination of geology and climate.
- At the European Scale the distribution of elements in the surface environment is clearly governed by natural processes, anthropogenic contamination plays a minor role for most elements (an exception is NO₃ in stream water).
- The maps demonstrate that it is impossible to define one common „good quality“ value for Europe in any one of the sample materials.

The atlas demonstrates that low density continental scale geochemical mapping is viable and delivers important results for political decision makers at a very reasonable cost. Geochemical maps of Europe should be constructed for even more sample materials and clearly need to be consulted before any political decisions on expensive monitoring activities (e.g. of European soils or water) are taken. When studying the atlas maps it may appear surprising that such information was completely missing up to now. These maps provide the basis for understanding the processes determining the distribution of chemical elements at the Earth's surface, they provide the very foundation for regional geochemistry.

Reference

SALMINEN, R. (Chief-editor), BATISTA, M.J., BIDOVEC, M., DEMETRIADES, A., DE VIVO, B., DE VOS, W., DURIS, M., GILUCIS, A., GREGORAUSKIENE, V., HALAMIC, J., HEITZMANN, P., LIMA, A., JORDAN, G., KLAVER, G., KLEIN, P., LIS, J., LOCUTURA, J., MARSINA, K., MAZREKU, A., O'CONNOR, P.J., OLSSON, S.Å., OTTESEN, R.-T., PETERSELL, V., PLANT, J.A., REEDER, S., SALPETEUR, I., SANDSTRÖM, H., SIEWERS, U., STEENFELT, A. & TARVAINEN, T.: Geochemical Atlas of Europe. Part 1 – Background Information, Methodology and Maps. – 526p., Espoo (Geological Survey of Finland) 2005.

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GEOCHEMICAL MAPPING

Chemical elements are the basis of all life on earth.

The atlas shows the geographical distribution of elements and chemical compounds in soils, stream sediments and water at the European scale.

Internet version of the Atlas:
www.gtk.fi/publ/foregsatlas/

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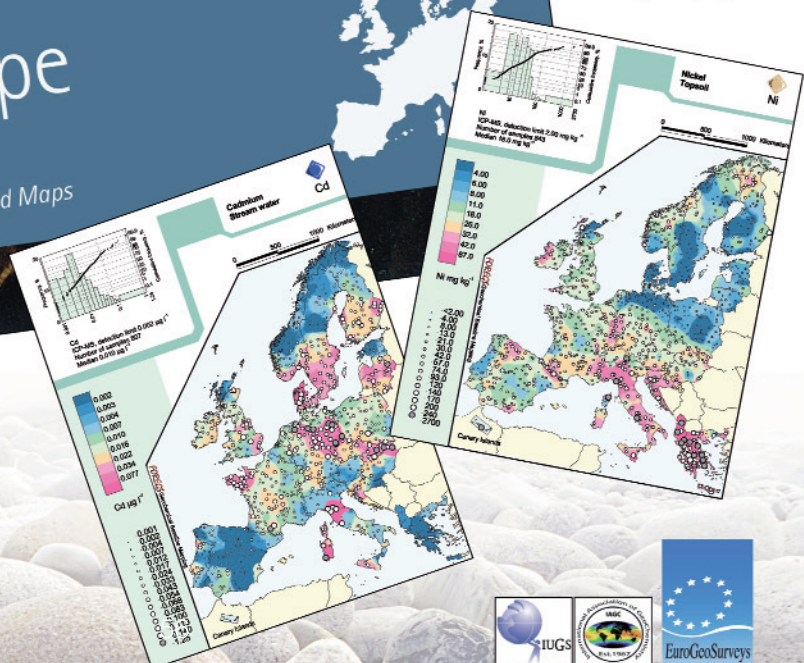
Geochemical Atlas of Europe

Part 1

Background Information, Methodology and Maps

RELEVANT FOR:

- Mineral Exploration
- Agriculture and Forestry
- Land use policy
- Health related research
- Environmental Policy



The EuroGeoSurveys Geochemical Atlas of Europe

Natural element concentrations in the different sample materials vary by up to 4 orders of magnitude on the European scale (e.g. *U* in stream water 4 orders of magnitude, *U* in subsoil 3 orders of magnitude).

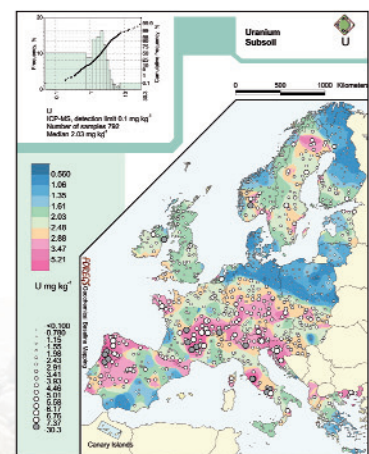
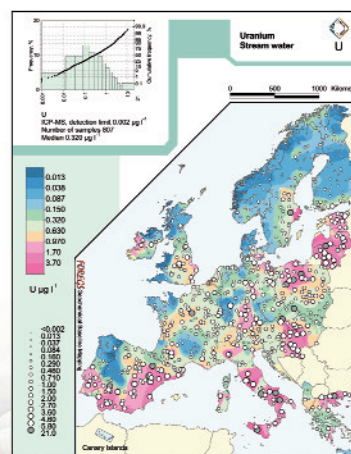
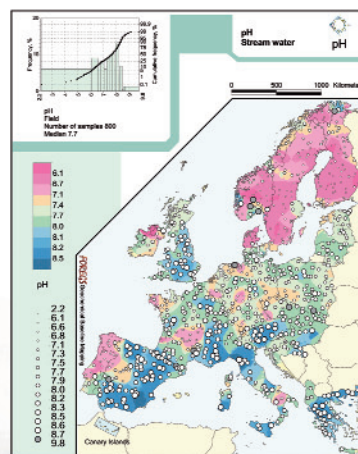
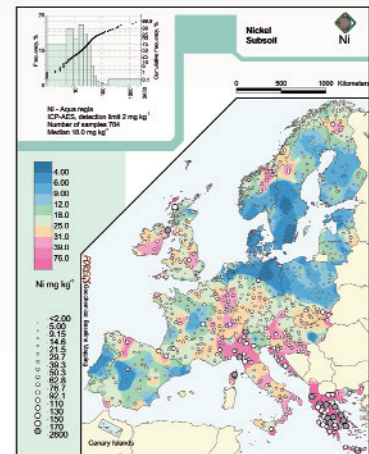
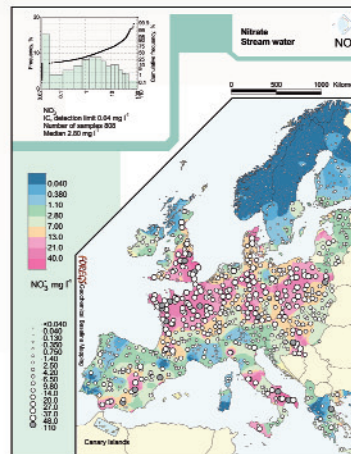
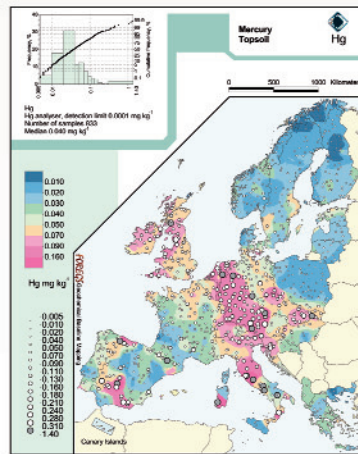
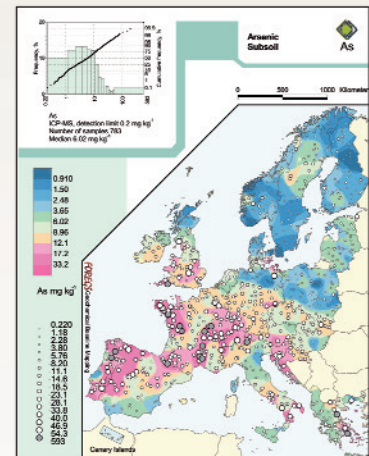
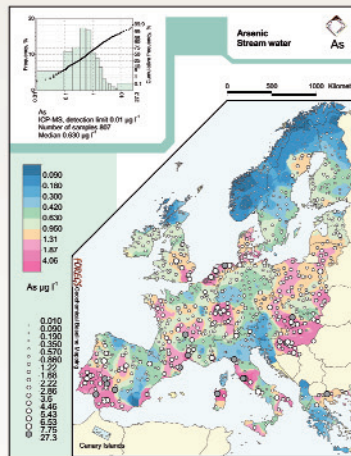
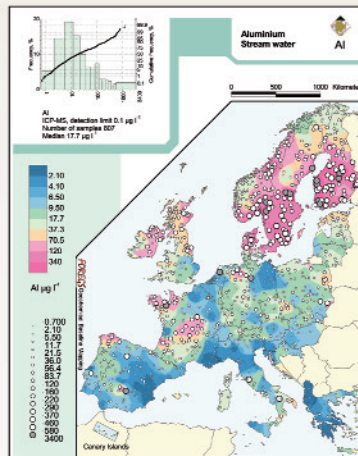
Large scale geochemical patterns emerge, most of these are caused by a combination of geology and climate (e.g. low pH in the stream waters in the Nordic countries causing high Al-concentrations).

At the European scale the distribution of elements in the surface environment is clearly governed by natural processes, anthropogenic contamination plays a minor role for most elements (for an exception see NO_3 in stream water).

Geology may appear far removed from human and animal health, however, rocks and minerals and the soils derived from these are the primary source of all elements that are critical to our well-being. Their distribution needs to be documented at the continental scale (e.g. *As*, *Ni*, *U*).

The maps demonstrate that it is impossible to define one common "good quality" value for Europe. Most elements show for example much lower element concentrations in northern than in southern Europe (e.g. *As*, *Ni*, *U* in subsoil).

Some maps show surprising patterns that still await interpretation (e.g. *Hg* in topsoil).



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