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Soil Geochemical Baselines of Ni on a Continental, National and Local Scale

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Introduction

The abundances of the chemical elements in the Earth's surface materials are relevant to agriculture, soil fertility, forestry, animal and human health, industrial pollution, mineral resource potential, setting of environmental standards, water quality and land-use planning. Systematic environmental geochemical baseline data are necessary to inform policy makers and to provide a sound basis for legislation. Geochemical baseline mapping provides background information for environmental assessment.

Results

The Geological Survey of Finland (GTK) has experience in geochemical mapping on a continental scale (Fig. 1), a national scale, a regional scale (Fig. 2) and even on a local scale within urban areas. Since 2016, GTK has carried out soil geochemical baseline mapping around mining areas. A large Ni anomaly related to greenstone belt can be detected on the European scale and the national scale geochemical maps in Finnish Lapland. In the European-wide FOREGS map (Fig. 1) and on the regional scale geochemical map (Fig. 2), the Ni concentrations in subsoil within the anomaly zone of Finnish Lapland are 40 – 100 mg/kg. In 2016, GTK took soil samples at 35 sites of the Kevitsa Ni mining area surroundings (Fig. 3). The Ni concentrations were 18 – 228 mg/kg in subsoil and the calculated upper limit of baseline variation for Kevitsa mining area surroundings was 110 mg/kg. Thus, even the European-wide geochemical map provided a good estimate for the soil geochemical baseline for this anomalous zone. However, the much higher concentrations of potentially harmful elements have been found on the local scale baseline mapping around other mining area surroundings, which are not so clearly detected on a European scale.

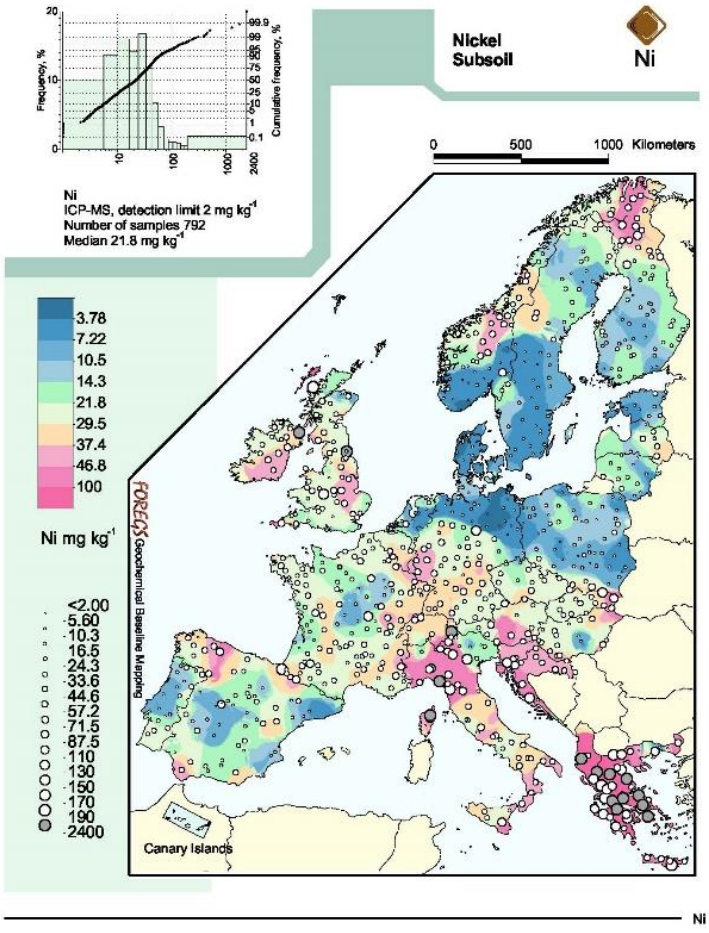

Figure 1. Geochemical map showing the distribution of Ni in subsoil (<2 mm grain size, total dissolution) in Europe. FOREGS Geochemical mapping (Salminen *et al.*, 2005).

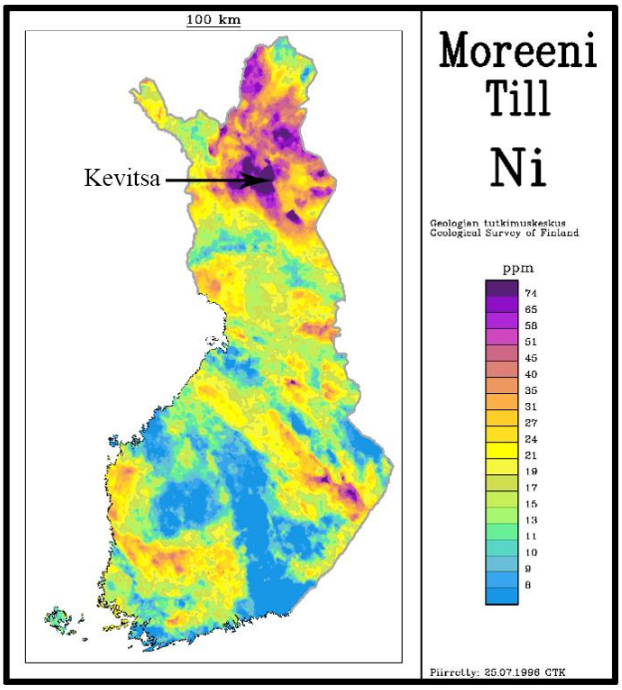

Figure 2. Geochemical map showing the distribution of Ni in glacial till (<0.06 mm grain size, *agua regia* extraction) in Finland on a regional scale (Salminen, 1995).

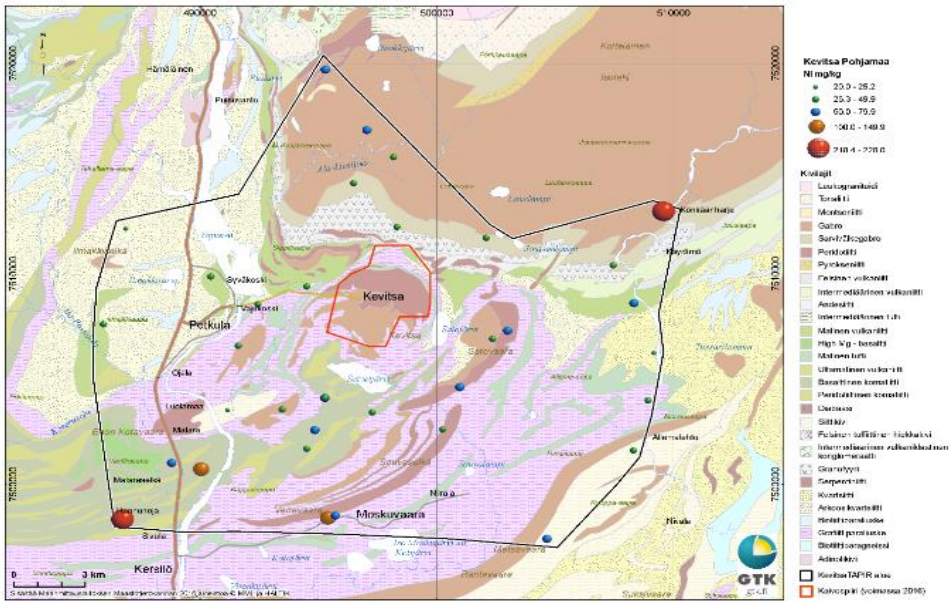

Figure 3. Geochemical map showing the distribution of Ni in soil parent material (<2 mm grain size, *aqua regia* extraction) in Kevitsa, Sodankylä, Finland.

Acknowledgements

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References

Salminen, R. (Ed.), 1995. Alueellinen geokemiallinen kartoitus Suomessa vuosina 1982 – 1994. Geologian tutkimuskeskus. Tutkimusraportti 130. Geological Survey of Finland. Report of Investigation 130.

Salminen, R. (Chief-Ed.), 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., 2005. Geochemical Atlas of Europe. Part 1 – Background Information, Methodology and Maps. Geological Survey of Finland, Espoo, Finland, 526 p.; http://weppi.gtk.fi/publ/foregsatlas/.