Geophysical Research Abstracts
Vol. 16, EGU2014-6551, 2014
EGU General Assembly 2014

GEMAS - Soil geochemistry and health implications

Vibeke Ernstsen (1), Anna Ladenberger (2), Joanna Wragg (3), and Aleksandra Gulan (4)

(1) Geological Survey of Denmark and Greenland (GEUS), Copenhagen K, Denmark (ve@geus.dk, +45 38142050), (2) Geological Survey of Sweden, Box 670, S-751 28 Uppsala, Sweden , (3) British Geological Survey, Environmental Science Centre, Nicker Hill, Keyworth, Nottingham, NG12 5GG, UK, (4) Geological Survey of Serbia, Rovinjska 12, Belgrade, Serbia

The GEMAS Project resulted in a large coherent data set displaying baseline levels of elements in agricultural and grazing land soil, which has a wide variety of applications. Medical geology is an emerging new discipline providing a link between geoscience and medicine by interpreting natural geological factors in relation to human and animal health and their geographical distribution. Medical geology shows not only problems related to harmful health effects of natural geological materials and processes, but also deals with their beneficial aspects.

Since the GEMAS project demonstrates the importance of geological factors in geochemical patterns in European soil, this data set can be used in improving our understanding of how the geological processes may affect human health in Europe. The main potential health problems are related to deficiency of nutrients in soil and toxic effects of potentially harmful elements. Deficiency in macro- (e.g., K, Fe, Mg, P) and micro-nutrients (e.g., Se, Zn, Cl) can be responsible for a reduction in crop productivity and certain health issues for livestock and humans. On the other hand, bioavailability of crucial elements depends on soil parameters, e.g., pH; namely, low pH in soil (in northern Europe) makes more micronutrients bioavailable, with the exception of Mo, P and Ca. Rocks underlying the soil layer have a major impact on soil composition, and soil parent material can be a main source of toxic metals, for instance, soil developed on black shale (e.g., Oslo region) shows potentially toxic levels of metals, such as As, Cd, U, Zn and Pb. High content of organic matter is another factor amplifying the toxic levels of metals in soil.

Several important topics with health implications can be then addressed using the GEMAS data set, namely, soil properties and element bioavailability, arsenic toxicity, selenium deficiency, potential health effects of liming, uranium in European soil, influence of recent and historical volcanic activity on soil composition and its health consequences.

References

Reimann, C., Birke, M., Demetriades, A., Filzmoser, P. & O'Connor, P. (Editors), 2014. Chemistry of Europe's agricultural soils – Part A: Methodology and interpretation of the GEMAS data set. Geologisches Jahrbuch (Reihe B), Schweizerbarth, Hannover, 528 pp.

Reimann, C., Birke, M., Demetriades, A., Filzmoser, P. & O'Connor, P. (Editors), 2014. Chemistry of Europe's agricultural soils – Part B: General background information and further analysis of the GEMAS data set. Geologisches Jahrbuch (Reihe B), Schweizerbarth, Hannover, 352 pp.