

## THE GEMAS PROJECT: GEOCHEMISTRY OF EUROPEAN AGRICULTURAL AND GRAZING LAND SOILS.

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**KEY WORDS:** *GEMAS; Geochemical atlas of Europe; grazing land; agricultural land; soils;*

### TITLE OF SECTION

The administration of REACH (Registration, Evaluation and Authorisation of Chemicals), the new European Chemicals Regulation adopted in December 2006, and the pending EU Soil Protection Directive, require additional knowledge about 'soil quality' at the European scale.

The geochemical atlas of agricultural and grazing land soils with the acronym GEMAS is a collaborative project of experts from national institutions, Universities and the European Association of Metals (Eurometaux –[www.eurometaux.eu](http://www.eurometaux.eu)).

The project will provide background values for a large variety of elements/parameters in agricultural and grazing land soil at the European scale.

During 2008 agricultural soils (Ap-horizon, 0-20 cm, regularly ploughed fields) and soils from land under permanent grass cover (grazing land soil, 0-10 cm) were collected at the European scale at an average sample density of 1 site / 2500 km<sup>2</sup> (2211 samples of agricultural soil and 2118 samples of grazing land soil) according to an agreed field protocol ([www.ngu.no/upload/Publikasjoner/Rapporter/2008/2008\\_038.pdf](http://www.ngu.no/upload/Publikasjoner/Rapporter/2008/2008_038.pdf)).

Following an aqua regia extraction concentrations

of the elements Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, Hg, In, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Pd, Pt, Rb, Re, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn and Zr were determined.

The GEMAS project will deliver good quality and comparable exposure data of inorganic elements in agricultural and grazing land soil; in addition, soil properties, known to influence the bioavailability and toxicity of inorganic elements, will be determined on soil at the European scale. As inorganic elements occur naturally, industry dealing with natural resources requires this information to prove that it can produce its substances safely, which is a REACH requirement. In addition, the GEMAS project results will be useful to public health authorities, environmental policy makers and mineral exploration companies.

The results indicate that the chosen sample density of 1 site / 2500 km<sup>2</sup> is sufficient to detect and document large scale processes determining element distribution at the European scale. The initial results indicate also that nature, geology and climate are the major driving forces for the mapped distribution of element patterns at the European scale.

Anthropogenic anomalies due to industry, agriculture, etc. occur on a more local scale. Many elements show substantially lower concentrations in the North European than in the South European soils.