Tin concentrations in European soils

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Tin is commonly associated with processes related to magmatic differentiation and can often be found in fissures and veins, as well as disseminations in peraluminous leucocratic granitic rocks. The most important tin deposits in Europe occur in the European Variscides. Tin was a very important metal in history and for the development of human civilization. The first use was an alloy with copper and arsenic to form bronze and with silver for coinage. Europe has the highest population density in the world, despite the fact that the Nordic countries have a density of less than 30 people per km^2.Human impact and soil management since ancient times can therefore be relevant. This fact complicates any interpretation of the regional distribution of metallic elements such as this one. We present results at the European scale based on the 848 FOREGS topsoil and 788 FOREGS subsoil samples with a resolution of 1 per 5000 km^2.

Tin performed maps show that the soils of North-Eastern sector of Europe have lower concentration than South-Western part of Europe. This concentration break occurs along the southern border of the last glaciation. Very high concentrations (anomalies) are related with granitic intrusions that occur in: northern Portugal, southern Spain, Massif Central, Brittany, Cornwall and Saxony. A very high tin concentration has been observed in a topsoil from Norway and may have anthropogenic origin. The overall tin median value in sub and topsoils of the original FOREGS samples is 3 mg kg^{-1}. The value for NE Europe is 3 mg kg^{-1} for topsoils and 1 mg kg^{-1} for subsoils, while in SW Europe the median is 4 mg kg^{-1} for both top and subsoils. Granitic intrusions in the northern region of Portugal have tin concentrations that range between 5 mg kg^{-1} and 42 mg kg^{-1}, Cornwall in UK between 5 mg kg^{-1} and 100 mg kg^{-1} and polymetallic sulphide vein-type mineralisations in Saxony, Germany from 42 mg kg^{-1} until 13,000 mg kg^{-1}. Soils related to mafic rocks show the lowest average tin concentrations (0.35-0.5 mg kg^{-1}) whereas soils at argillaceous sediments have higher values (6-10 mg kg^{-1}). At our sampling resolution, it is much easier to distinguish geogenic anomalies than anthropogenic ones and the impact of human activities remains almost invisible at this resolution.

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