



GEMAS: Geochemical distribution of iodine in European agricultural soil

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Iodine concentrations are reported for the < 2 mm fraction of soil samples from agricultural land (Ap, 0-20 cm, N=2213) in 33 European countries, covering 5.6 million km² at a sample density of 1 sample per 2500 km². The analyses were carried out by ED-XRFS (energy dispersive X-ray fluorescence spectrometry). The European median I concentration is 2.70 mg/kg in agricultural soil (including eastern Ukraine), with a range of < 0.5 to 317 mg I/kg. Only 2.5 % of the Ap samples returned results below detection for I. A comparison of the map of the measured I concentrations with that of the clr-transformed data provides additional information about sources and processes influencing the I distribution in agricultural soils at the European scale.

The spatial distribution patterns of I in the Ap samples are mainly governed by climate, soil formation processes, and geology (parent material, in some cases mineralisation). The distribution of anomalous I concentrations is likely a reflection of I input from atmospheric and marine sources, as well as the accumulation of I as a result of sorption on organic material. Across Europe, high I areas correlate well with soil with elevated TOC values. This is particularly evident for the western coastal areas of Ireland, UK, Norway, Galicia and France, where the organic matter content in the soil is generally high. The continuous supply of I from sea spray represents a potential source for high and elevated I concentrations. In the coastal zones of SE Spain, SE Ukraine and SW Croatia the I concentration in Ap samples is usually high. Along the eastern Adriatic coast as well as in South-East Ukraine and in the Crimea the elevated and anomalous I concentrations correspond well with the distribution of terra rossa soils developed on karst and organic-rich soils (black soil). In SE Spain the I enriched soils are most likely related to the occurrence of evaporites. The comparison of I background values (medians) based on the parent materials demonstrates a higher I content in soils over limestone and shale. Iodine-low soil areas (< 1.5 mg I/kg) correspond well with sandy deposits (East Germany, Poland, Lithuania and Latvia), sedimentary rocks (central Iberian Peninsula) and glacial and aeolian deposits (NW Ukraine).