



Arsenic background and baseline values in soils from Murcia Region (SE, Spain)

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Arsenic is a strongly chalcophile, and is partitioned into a variety of sulphide and sulpharsenide minerals, notably arsenopyrite FeAsS, but also realgar and orpiment. It is also widely present as an accessory element in other sulphide minerals such as galena, pyrite and sphalerite.

The objective of this study was to determine the arsenic background and baseline level in soils from the Region of Murcia (Southeast, Spain) and to study the possible relationship between mineralogical composition and arsenic concentration. Sampling sites were selected in areas subjected to high and similar agricultural activity or abandoned agricultural soils with natural vegetation, that are not subjected to particular point contamination sources. A total of 490 samples were collected, and the mineralogical composition and the arsenic content were determined. Samples were analysed for arsenic content by atomic fluorescence spectrometry (AFS). Background and baseline values could be determined for each geological unit, because of its unique and differentiating geochemical pattern. For some samples, the soils were influenced by the erosion of surrounding mountains, which belong to different geologic units and, as a consequence, background and baseline value determination was more difficult. Four different groups were established based on significant relationship with the mineralogical composition in soil samples, using discriminant analysis. The results showed that the concentration of arsenic is correlated with the mineralogical composition. Thus, arsenic level is positively correlated with the phyllosilicate content. In summary, the background level, showed as the median was 6.65 mg kg⁻¹ and the baseline level, showed as mean + 2*Std. deviation, was 21.14 mg kg⁻¹. Since the As content varied as a function of the mineralogical group, baselines of arsenic could be established for the four mineralogical groups as follows: 49.59 mg kg⁻¹ for group 1, 12.57 mg kg⁻¹ for group 2, 11.14 mg kg⁻¹ for group 3 and 14.15 mg kg⁻¹ for group 4.

Given that heavy metal concentrations in the study area were similar to those analysed in other areas of similar lithological characteristics, it follows that the background and baselines values established could be comparable to background and baselines values in other areas with a similar geological substrate.