Geophysical Research Abstracts
Vol. 17, EGU2015-14549-1, 2015
EGU General Assembly 2015

Geostatistical analysis of soil geochemical data from an industrial area (Puertollano, South-Central Spain).

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Puertollano is the biggest industrial city of Castilla-La Mancha, with 48,086 inhabitants. It is located 250 km South of Madrid in the North border of the Ojailén River valley. The industrial area includes a big coal open pit (ENCASUR), two power plants (EON and ELCOGAS), a petrochemical complex (REPSOL) and a fertiliser factory (ENFERSA), all located in the proximities of the town. These industries suppose a complex scenario in terms of metals and metalloids emissions. For instance, mercury emissions declared to PRTR inventory during 2010 were 210 kg year-1 (REPSOL), 130 kg year-1 (ELCOGAS) and 11,9 kg year-1 (EON). Besides it still remains an unaccounted possibly of diffuse sources of other potentially toxic elements coming from the different industrial sites.
Multielemental analyses of soils from two different depths covering the whole valley were carried out by means of XRF with a portable Oxford Instruments device. Geostatistical data treatment was performed using SURFER software, applying block kriging to obtain interpolation maps for the study area.
Semivariograms of elemental concentrations make a clear distinction between volatile (Hg, Se) and non-volatile elements (Cu, Ni), with differences in scales and variances between the two soil horizons considered. Semivariograms also show different models for elements emitted by combustion processes (Ni) and for anomalous elements from geological substrate (Pb, Zn). In addition to differences in anisotropy of data, these models reflect different forms of elemental dispersion; despite this, identification of particular sources for the different elements is not possible for this geochemical data set.