Geophysical Research Abstracts
Vol. 17, EGU2015-14740-2, 2015
EGU General Assembly 2015

Geochemical baseline distribution of harmful elements in the surface soils of Campania region.

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Environmental geochemical mapping has assumed an increasing relevance and the separation of values to discriminate between anthropogenic pollution and natural (geogenic) sources has become crucial to address environmental problems affecting the quality of life of human beings.
In the last decade, a number of geochemical prospecting projects, mostly focused on surface soils (topsoils), were carried out at different scales (from regional to local) across the whole Campania region (Italy) to characterize the distribution of both harmful elements and persistent organic pollutants (POP) in the environment and to generating a valuable database to serve as reference in developing geomedical studies.
During the 2014, a database reporting the distribution of 53 chemical elements in 3536 topsoil samples, collected across the whole region, was completed.
The geochemical data, after necessary quality controls, were georeferenced and processed in a geochemistry dedicated GIS software named GEODAS. For each considered element a complete set of maps was generated to depict both the discrete and the spatially continuous (interpolated) distribution of elemental concentrations across the region.
The interpolated maps were generated using the Multifractal Inverse Distance eighted (MIDW) algorithm. Subsequently, the S-A method, also implemented in GEODAS, was applied to MIDW maps to eliminate spatially limited anomalies from the original grid and to generate the distribution patterns of geochemical baselines for each element.
For a selected group of elements geochemical data were also treated by means of a Compositional Data Analysis (CoDA) aiming at investigating the regionalised structure of the data by considering the joint behaviour of several elements constituting for each sample its whole composition.
A regional environmental risk assessment was run on the basis of the regional distribution of heavy metals in soil, land use types and population. The risk assessment produced a ranking of priorities and located areas of regional territory where human health risk is more relevant and follow-up activities are required.