



Distribution patterns and sources of metals and PAHs in an intensely urbanized area: The Acerra–Pomigliano–Marigliano conurbation (Italy)

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The main objective of the URGE (URban GEOchemistry) project is to define, map and interpretate the geochemical baseline patterns of potentially harmful elements and compounds in the soils of 12 European urban areas using shared procedures for both sampling and analytical techniques.

In Italy, in the framework of the URGE project, the north-eastern sector of the Napoli metropolitan area, namely the Acerra-Pomigliano-Marigliano conurbation, has undergone a geochemical characterization based on 145 soil samples collected over an area of 90 sq km. This area has been selected on the basis of the results obtained from previous regional studies [1, 2, 3] and because of the presence on its territory of an historical industrial settlement (formerly devoted to plastic materials and synthetic fibres production) which was partly dismantled and partly converted to a power plant fuelled by palm oil. Furthermore, in March 2009 also an incinerator came into operation in the northern sector of the study area.

The main objective of the study carried out for the Acerra-Pomigliano-Marigliano conurbation was to define the local geochemical baselines for both 53 elements (among which the toxic ones) and some organic compounds, including PAHs and OCPs. The study also aimed at supporting epidemiological researches at local scale and at establishing a record of the actual environmental conditions to evaluate the future impact of the incinerator on both the territory and the public health.

Results obtained showed that Pb, Zn and V exceed the trigger limits established by the Italian Environmental law (D.Lgs. 152/2006) especially in correspondence with the most densely populated areas of the conurbation and where the traffic load is higher (Road junctions and fast lanes). Furthermore, most of the soils collected in the surroundings of the urbanized areas resulted to be generally enriched in Cu, Co, Cd, Be, Ni and P suggesting the presence of a relevant influence on their chemistry of an agricultural intensive land use.

PAHs distribution pattern showed anomalous values across the whole study area. Especially, Benzo[a]pyrene values exceeds the trigger limits established by the Italian Environmental law (D.Lgs. 152/2006) in most of the analyzed soils and the diagnostic ratios calculated among several PAHs compounds suggested that the biomass burning in the rural sector of the study area could be a relevant source of pollution. The palm oil fuelled power plant in the northern sector of Acerra could not be excluded as a source of PAHs in the environment.

[1] Albanese et al (2007) JGE 93, 21-34.

[2] Cicchella et al (2008) GEEA 8 (1), 19-29.

[3] De Vivo et al (2006) Aracne Editrice, Roma. 324 pp.