

Solutes dynamics in the surface layer of anthropized soils in the province of Brescia (Italy)

Marco Peli (1), Giulia Raffelli (1), Stefano Barontini (1), Roberto Lucchini (2,3), and Roberto Ranzi (1)

(1) University of Brescia, DICATAM, Italy (m.peli010@unibs.it), (2) University of Brescia, DSMC, Italy, (3) Icahn School of Medicine at Mount Sinai, New York, USA

For the last forty years, a ferroalloy industry has been working in Bagnolo Mella, a municipality nearby the city of Brescia (Italy), producing particulate emissions enriched in manganese (Mn), lead (Pb), zinc (Zn), copper (Cu), cadmium (Cd), chromium (Cr), iron (Fe), and aluminum (Al). Although some of these metals are required trace elements for most living organisms and can be largely found in natural environment (e.g. Mn being the fifth most abundant metal in the Earth crust), they all lead to toxic effects in the exposed population when they contaminate the environmental matrices (soil, air, water) of the surrounding urban ecosystem.

Aiming at contributing to quantify the exposure of the population to pollution in the environmental matrices around the factory, in this work we investigated the metals and water fluxes within the Earth Critical Zone.

The factory is located near residential areas in a plain characterised by little wind and shallow water table with a great number of water resurgences. Three test sites were identified among the pronest ones to particulate matter deposition, on the basis of data collected during a previous experimental field campaign and of the local wind rose. One more site was selected upwind to the factory as a reference site minimally prone to particulate matter deposition, on the basis of the previous investigations. Moreover sites where lawns have been maintained at least for the last forty years were selected in order to avoid agriculture—induced effects on the metals movement. Total soil metal concentrations were measured by means of a portable X-Ray Fluorescence(XRF)device along the soil profiles, down to the depth of 40 cm. The hydrological behaviour of the soils was characterized by means of a tension infiltrometer and laboratory analyses.