Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09175, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09175
EGU General Assembly 2008

Distribution of Metals in Particle Size Fractions of Soils Developed on Igneous Rocks from Murcia Province, SE Spain

S. Martínez-Martínez (1), A. Faz (1), J.M. Arocena (2) and J.A. Acosta (1)

(1) Soil and Water Use, Management and Remediation Research Group. Department of Agrarian Science and Technology. Technical University of Cartagena. Paseo Alfonso XIII, nº 52, 30230, Cartagena. Murcia. Spain (silvia.martinez@upct.es), (2) Canada Research Chair-Soil and Environmental Sciences, University of Northern British Columbia, 3333 University Way, Prince George, British Columbia V2N 4Z9 (arocena@unbc.ca)

The distribution of metals in soils is known to be influenced by particle size fractions. The fine particles show high concentration of metals due to large surface area, high clay minerals and organic matter contents, and the presence of Fe-Mn oxide phases. In this study, we selected 12 representative soils developed from the following igneous parent rocks in Murcia Province, SE Spain: Tertiary Pliocence basalts at (1) “Cabezo Negro de Tallante” and (2) “Sierra de la Muela” (Mazarrón); lamproites in (3) “Cerro de Salmerón", (10) Barqueros (Andaluciense-Mesiniense Superior Miocene), (7) La Aljorra, (8) “Cerro Negro” (Calasparra), (9) Fortuna (Fortunites), and (4) Tertiary Jumillites at the“Mineralizaciones de la Celia”; Tertiary Miocene Tortoniense (5) rhyodacites and (6) dacites in Mazarrón; (11) Tertiary Miocene andesites at “Isla del Ciervo” (La Manga del Mar Menor); and finally, (12) Superior Triassic diabases at Santomera (Ballabona-Cucharón Complex). These Mediterranean areas are characterised by low rainfall and high evapotranspiration, where parent material has a strong influence on soil development and evolution because soils are in early stages of development. The aim of this study was to determine the effect of the particle size on distribution of metal in soils. We collected soil samples from each recognizable horizon in a representative soil profile in each type of parent rock. We used various analytical methods to determine pH, electrical conductivity, total organic matter, total

nitrogen, equivalent calcium carbonate, cation exchange capacity, and clay, silt and sand contents. Clays were separated from sand and silt through successive dispersion and gravity sedimentation following the principles of Stoke's Law. The sand fraction from each sample was separated from the silt fraction by wet sieving on a 53-μm sieve. Clay, sand and silt fractions from each soil horizon were analysed for metal contents. Analytical technique used to estimate the contents of Cu, Pb, Zn, Cr, Co and Mn was ICP-MS, after a total acid digestion (HF+HNO_3) in microwave. Soil profiles in each parent rock were classified (USDA, 2006) as follows: Lithic Torriorthent - diabase (12), lamproite (9), and basalt (1); Aridic Haploxeroll - dacite (6) and lamproite (7); Lithic Haploxeroll - andesite (11), lamproite (10) and riodacite; Lithic Xerorthent - lamproites (4), (8) and (3), and finally, Lithic Torripsamment - basalt (2). Analytical results showed that Cr, Co and Mn accumulated in high concentrations in the sand fraction. However, Cu, Pb and Zn contents were highest in the clay fraction. The contents ranged from 24-370 mg Cu/kg; 42-399 mg Pb/kg and 40 -185 mg Zn/kg. The results suggested that Cu, Pb and Zn may present some environmental risks because fine particles are more soluble than coarse sandy materials due to high surface area; fine particles are also mobile and easily inhalable and might impact the quality of the trophic chain.

Keywords: Metals, Clay, Silt and Sand Fractions, Igneous Rocks, Soil Profiles.