Geophysical Research Abstracts
Vol. 19, EGU2017-16064, 2017
EGU General Assembly 2017

Chemistry of volcanic soils used for agriculture in Brava Island (Cape Verde)

Maria Isabel Prudêncio (1), Rosa Marques (1), João Carlos Waerenborgh (1), Bruno José Vieira (1), Maria Isabel Dias (1), Fernando Rocha (2,3)

(1) Centro de Ciências e Tecnologias Nucleares (C2TN), Instituto Superior Técnico, Universidade de Lisboa, EN 10 (km 139.7), 2695-066 Bobadela, Portugal (iprudenc@ctn.tecnico.ulisboa.pt), (2) GeoBioTec, Universidade de Aveiro, Campus Univ. Santiago, 3810-193 Aveiro, Portugal, (3) Dep. de Geociências, Universidade de Aveiro, Campus Univ. Santiago, 3810-193 Aveiro, Portugal

Brava is a small volcanic island located on the south-western part of the Cape Verde archipelago. It is characterized by an irregular plateau between 300 and 976 m above sea level, which is bounded by steep coastal cliffs and cut by fluvial incision in a generally radial drainage pattern. The major volcano-stratigraphic units of the island are: Lower Unit, Middle Unit, Upper Unit, and Sediments. Although Brava is one of the islands with more frequent rainy periods in Cape Verde, the climate is essentially semi-arid, which associated with the rough topography leads to incipient soils. Detailed Fe speciation and chemical composition studies of Cape Verde soils have shown that oxidation is a major weathering mechanism, and high contents of trace elements may occur originated from imbalance of elements in the volcanic parent materials, which can be a threat to the environmental health.
The soils mostly used for agriculture in Brava Island are those developed on phonolitic pyroclasts on the plateau and also on sediments. In this work the whole sample (< 2 mm) and the clay-sized fraction (< 2 μm) of these soils were analysed by Mössbauer spectroscopy and neutron activation analysis, aiming to characterize the iron speciation and to determine the concentration and distribution of 30 chemical elements in Brava soils.
Mössbauer spectroscopy shows that Fe is more oxidyzed in topsoils developed on sediments (84-87%) than in soils developed on pyroclasts (71-79%). In the clay sized-fraction of all the studied soils only Fe(III) was detected. Iron oxides clearly distinguish the soils derived from the two types of parent materials, hematite being the only Fe oxide present in soils developed on sediments, while maghemite is more abundant in soils developed on pyroclasts. Iron and chromium are depleted in this fine fraction suggesting their occurrence as iron oxides and ferromagnesian minerals present in coarser particles. Among the chemical elements studied, antimony was found to be particularly concentrated in the clay-sized fraction (up to 28 mg/kg) in soils located in the northern part of the island. The existence of significant Sb amounts in the fine particles may contribute to its accumulation in plants both by absorption or by dust deposition onto the plant leaves.