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different depths in order to determine the diffusivity of radon and its correlation to geogas (CO_2) flux.

Radiometric characterization of the investigated sites was completed with laboratory measurements of concentrations of radionuclides in groundwater samples, by means of scintillation technique, and in rock samples by gamma spectroscopy. With the aim to better define the transport process of radon through fractured media, laboratory measurements are performed on rock samples at different controlled physical conditions (porosity, temperature, pressure, water content) in order to extract radon exhalation rate in simulated volcanic environment. The results will represent a contribution to enlighten on correlation between radon concentration and volcano/tectonic activity.

THE APPLICATION OF GEOTECHNOLOGICAL TOOLS FOR THE CONSTRUCTION OF Cs-137 VULNERABILITY MAPS IN BRAZILIAN SOILS

M. A. WASSERMAN[1], P. PICANÇO JR[2], J. ARAÚJO RIBEIRO[2] AND J. C. WASSERMAN[3]

[1]*Institute of Radioprotection and Dosimetry-CNEN, Brasil*
[2]*University of Rio de Janeiro, Brasil*
[3]*Fluminense Federal University, Brasil*

The behaviour of radionuclides in soil is governed by several mechanisms that can vary significantly according to the specific reactivity of each element and soil properties. Previous radioecological studies in some Brazilian soils showed that properties such as high acidity, very low organic matter content, low fertility and high Fe-Al oxide content make them more vulnerable to radionuclides contamination than temperate soils. The soil to plant transfer factor (TF) is the parameter that describes the interaction occurring between the soil and plants for a given radionuclide. The existence of various soil classes associated with different agricultural species and regional cultural practices, results in a broad range of transfer values for the same radionuclide. However, it has been experimentally observed that if a soil has specific properties that favor radionuclide transfer, any species growing in this soil will present a high concentration of this contaminant. In this work the objective was to develop a methodological tool to map rural soils, defining their vulnerability to ^{137}Cs contamination. Previous radioecological studies identified that for each category, some soil properties showed to be more relevant than other, so based on pedological analyses for a given class of soil, was theoretically possible to classify the area according to their potential vulnerability and estimate TF. For that we used the software ArcGIS (ESRI) to construct a Geographic Information System basing on 1) Brazilian soil classes; 2) soil to plant transfer factor values for reference species obtained in experiments conducted in Brazilian soils and other extreme case studies reported in the literature 3) soil parameters that interferes on ^{137}Cs behavior in soil such as exchangeable K, cation exchange capacity, pH and organic matter content. It is important to note that a same class of soil can present different levels of vulnerability

depending on soil properties, so the soil class is an important input only to define limit of areas. The vulnerability of soils to ^{137}Cs contamination was defined considering five categories: 1) extremely vulnerable soils, where TF for cereals are expected to be ≥ 1 and remains high with the soil ageing; 2) highly vulnerable, where TF for cereals are expected to be between <1 and ≥0.1; 3) vulnerable soils, where TF for cereals are expected to be between <0.1 and ≥0.05; 4) mildly vulnerable soils, where TF for cereals are expected to be between <0.05 and ≥ 0.01, and 5) invulnerable ageing soils, where TF for cereals are expected to be <0.01 and reduce with the soil ageing. A test map was built using a real area with some Brazilian soils with known physico-chemical properties, but unknown TF and areas representing soils where values reported for ^{137}Cs TF and soil properties were available in the literature originated from experimental essays studies, carried out in nuclear tests areas or Chernobyl accident. Our first approach showed that vulnerability of the studied soil from the real area (Cambisol and Ferralsol) varied from the highly vulnerable and vulnerable, what was very consistent with experimental results obtained in other soil classes from Brazil (Histisol, Ferralsol, Acrisol and Nitisol). This mapping can be an important tool to improve planning emergency actions in rural areas identifying vulnerable areas and suitable remediation.