A geostatistical investigation of the spatial variation of external gamma exposure in urban area of Poços de Caldas Plateau

Nivaldo C. Silva[*1], José F. Macacini[1]; Maria H. T. Taddei[1] ; Marcelo Montaño[2]; Aurelio T. Fontes[2]

[1]Laboratory of Poços de Caldas - Brazilian Commission for Nuclear Energy
Rodovia Poços de Caldas – Andradas, km 13 37701-970 Poços de Caldas-MG Brazil

[2]Laboratory of Geographical Information Systems, EESC, University of São Paulo
Av. Trabalhador Sancarlense, 400 13566-590 São Carlos - SP Brazil

Abstract

The Poços de Caldas Plateau has been recognized as High Level of Natural Radiation Area for a long time. It consists in an alkaline intrusion with some uranium and thorium anomalies, where the first Brazilian uranium mining and milling facilities is located. Due to these facts, the population of Poços de Caldas city shows a great deal of concern about radiation health effects. This perception of the risks of radiation exposure leads to much confusion among the population that attributes an imaginary excess (without an scientific support) of cancer cases and deformities in newborns in the city to radiation. In order to obtain information for help radiation risks management by government and to explore the spatial variation external gamma exposure a survey in the urban area of Poços de Caldas city was done. The measurements were performed using a Mobile Radioactivity Measurement System - Mobisys (ESM Eberline model FHT 1376). The system consists of a high-sensitivity 5-liter scintillation detector, an electronic for measurement system that is able to on-line separate natural and artificial gamma radiation (Natural Background Rejection Detector – NBR), one compact Global Positioning System – GPS and a computer (notebook). Data was collected at approximately 50,000 points spread over all streets of city. The obtained results ranged from 40 $nSv.h^{-1}$ to 420 $nSv.h^{-1}$ where the mean value was 112 $nSv.h^{-1}$. The spatial distribution of gamma exposure over the city is quite homogeneous with lowest and highest values in western and southern area, respectively.

KEYWORDS: Natural radiation, Poços de Caldas Plateau, radiation monitoring.

[*] Presenting author, E-mail: ncsilva@cnen.gov.br