



^{222}Rn concentrations and the radiation exposure levels in the Nerja Cave

C. Dueñas*, M.C. Fernández, S. Cañete

Department of Applied Physics I, Faculty of Sciences, University of Málaga, Campus de Teatinos s/n, Málaga, 29071 Spain

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Abstract

^{222}Rn concentrations in the air in one sampling point located in Nerja Cave (Spain) ($3^{\circ}52'35''$ W $36^{\circ}43'50''$ N) have been measured over one year, since July 2003–June 2004. ^{222}Rn levels were continuously monitored using Alpha-Guard (Genitron instruments) equipment, model PQ2000PRO. Firstly, the aim of this study was to perceive the daily, monthly and seasonal variations patterns of ^{222}Rn concentrations. Diurnal cycles are presented by season showing that the ^{222}Rn concentrations in spring–summer are higher than autumn–winter. The hourly variations are discussed in relation to various meteorological factors measured in the Cave and also on the outdoor. We have evaluated the radiation exposure levels for workers and tourists; those represent only a low percentage of the exposure guides for the general population (ICRP, 1994. Protection against Radon-222 at home and at work. Pergamon Press, Oxford (publication 65)).

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1. Introduction

The Nerja Cave was discovered in 1959 and now is the second natural monument with more visitors per year in Spain. The cave has three entrances, two of them are natural and one was constructed in 1960. It extends along a line 35°E with a main axis of about 250 m in length. It consists of a series of halls and side chambers separated by numerous banks of speleothems. Starting from the entrance, we find successively the Vestibule hall, the Ballet hall, the Mirador hall and the C. Hercules hall (Fig. 1).

2. Results and discussion

2.1. Temporal variation of ^{222}Rn concentration at the Ballet hall

The ^{222}Rn average monthly concentrations at the Ballet hall are shown in Fig. 2. The Box-and-Whisker Plot is particularly useful for comparing parallel batches of data. The central box covers the middle 50% of the data; the sides of the box are the lower and upper quartiles, and the horizontal line drawn through the box is the median. The whiskers extend out to the lower and upper values of the data (the range). The lower whisker is drawn from the lower quartile to the smallest point within 1.5 interquartile ranges from the lower quartile. The other whisker is drawn from the upper quartile to the largest point within 1.5 interquartile ranges from the upper quartile. We can see numerous anomalous data (outliers) which mainly correspond to May, August, September and October months and the high values

* Corresponding author. Tel.: +34 5 21 31 92;
fax: +34 952132384.

E-mail address: mcduenas@uma.es (C. Dueñas).