

Evaluation of soil-gas radon concentrations from different geological units with varying strata in a crystalline basement complex of southwestern Nigeria

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- Environmental Monitoring and Assessment **volume 194**, Article number: 486 (2022)

Abstract

The aim of this study is to determine the variation of soil-gas radon concentrations from different rock formations in Ogbomoso, southwestern Nigeria. The radon concentrations at different five geological domains in Ogbomoso are determined with respect to depth. The measurements varied from the surface (0 cm) to 100 cm depth, with an interval of 20 cm. At all the geological domains (Porphyroclastic, Granite, Quartzite, Migmatite and Banded gneiss), radon has its minimum emission over migmatite at 0 cm, while its maximum emissions occurred over granite and banded gneiss at 80 cm. The overall soil-gas radon concentrations in Ogbomoso varied from 0.06 to 26.5 kBq/m³, which is within the natural limit of 0.4 to 40 kBq/m³ based on the International Commission on Radiological Protection's recommendation. An F-ratio of 6.989 and a *p*-value of 0.001 were obtained for the first inferential hypothesis, while an F-ratio of 2.489 and a *p*-value of 0.076 were obtained for the second inferential hypothesis using ANOVA test. The post hoc (using Tukey HSD and Duncan) tests revealed that at 60 + cm, depth controls the level of radon concentrations being emanated from the subsurface. The pollution index in Ogbomoso is of level 1 at 80 cm and level 0 (safe limit) at other depths. In conclusion, the soil-gas radon emission depends on the local geology and lithological sequences (depths). Cracks that could act as passage for indoor radon at the floors of the buildings around the polluted zones should be avoided in order to have a sustainable city.