

Relationships between geogenic radon potential and gamma ray maps with indoor radon levels at Ciampino, Caprarola and Celleno municipalities (central Italy)

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Exposures to relatively high indoor radon (^{222}Rn) levels represents a serious public health risk because Rn is associated with lung cancer. As such, it is very important to assess the indoor exposure to radon and its daughters. Rn is a natural ubiquitous gas and its abundance is mainly controlled by the geology, and in particular by the soil and rock content of its parent nuclide (^{238}U).

In this work, we propose a new geospatial technique to construct the geogenic radon potential (GRP) map of three municipalities in Latium region characterized by recent volcanic deposits with high content in radon parent nuclides. GRP map has been obtained by using Empirical Bayesian Kriging Regression technique with soil gas radon, as the response variable, and a number of proxy variables (i.e., content of the radiogenic parent nuclides, the emanation coefficient of the outcropping rocks, the diffusive ^{222}Rn flux, the CO_2 concentration, the ground permeability and the gamma dose radiation). Furthermore, possible relationships between predicted soil radon values and gamma radiation distribution with the indoor concentrations measured in private and public buildings has been investigated, respectively. The obtained results confirm that GRP maps provide the local administration of a useful tool for land use planning and that, the mapping of gamma emission, allows to a fast and effective evaluation of indoor radon hazard because it is mainly influenced by the building materials rather than other anthropic controls.