Quantitative Assessment of Radon Exhalation Rate from Construction Materials Used in Sardinian Cultural Heritage Structures

Daniele CHIRIU - *Università degli studi di Cagliari*

The use of locally sourced dimension stones is a defining feature of Sardinian cultural heritage buildings. However, several of these materials — especially granites, trachytes, and pyroclastic rocks — can emit radon gas due to their natural radionuclide content. This study presents a comprehensive analysis of some widely used Sardinian dimension stones, quantifying their radon exhalation rates and natural radioactivity levels. The experimental investigations were conducted within the ATHENA project, focusing on lithotypes of particular relevance to Sardinian architecture.

Radon exhalation rates were measured on natural stone samples using a closed-chamber method coupled with a Durridge RAD7 detector, while Raman spectroscopy was employed to gain deeper insights into the structural characteristics of the analyzed materials. A moderate correlation was observed between ^226Ra content and radon emission; however, physical properties such as porosity and microfracturing were also found to significantly influence radon release.

These findings underscore the importance of quantitative assessment of traditional building materials, particularly in the context of restoration or new construction within heritage sites, in order to mitigate radon-related health risks while preserving architectural authenticity.