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# Soil-gas radon concentration monitoring in an active granite quarry from Central Portugal

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This study was carried out in an active quarry located nearby the town of Nelas (Central Portugal), with the primary objective of assessing the effect of regular explosions on soil-gas radon concentrations. Here, a late-orogenic Hercynian porphyritic biotite granite occurs and is exploited for the production of high quality aggregates for different building purposes. This granite is part of the Beiras batholiths, being a geochemically moderately evolved rock, slightly peraluminous, and widely known by the frequent occurrence of associated uranium mineralizations. In fact, more than 4000t of U3O8 was produced from 60 mines of the Beiras region in the last century, over a wide area of more than 10.000 km2, and thousands of anomalies related with the local accumulation of uranium in fault filling materials, metasedimentary enclaves and doleritic veins were recognized during prospecting works. The heterogeneity of uranium distribution in this rock is reflected at the test site; indeed, a gamma ray survey shows that some of the faults that occur in the quarry are slightly mineralized. A total of 7 radon monitoring stations were implemented in the quarry, at a typical depth comprised between 1 and 2 meters, in holes drilled for the purpose. Aware RM-70 pancake GM detectors were used, sensitive to alpha, beta and gamma/X-rays above 10 keV, connected to palmtop computers for data registration (1 minute interval) and power supplied by batteries. Monitoring was carried out during 6 months, in Spring/Summer conditions and the exact time of each explosion was registered manually. Several problems of data loss and power supply affected the stations during the experiment, leading to discontinuities in the records. Still the available data showed important differences in the soil-gas radon concentrations between stations, which can be explained by the heterogeneity of uranium distribution in the rock and increased local permeability. Furthermore, all stations showed a clear daily cycle in radon concentration, with minina occurring in the afternoon, around 19h00 (local time) and maxima in the morning (around 7h00). No significant changes in soil-gas radon concentrations were observed for any of the stations at the moment of the explosions or in the following minutes. The most probable explanation for this fact is the absence of a progressive stress field affecting the rock, as likely occurs before an earthquake.