



Temporal variation analysis of radon progeny ratio behavior in outdoor air at two radiometeorological stations in Barcelona and Madrid

A. Vargas, D. Arnold, M.A. González, C. Grossi and X. Ortega

Institute of Energy Technologies, Technical University of Catalonia, Barcelona, Spain
(arturo.vargas@upc.edu / Fax: +34934017149 / Phone: +34934016049)

This work studies the concentration ratio of radon progeny (^{218}Po , ^{214}Pb and ^{214}Bi) in outdoor air at two radiometeorological stations. Radon daughter concentrations were measured continuously every hour using our own detector unit based on alpha spectroscopy of radon progeny activity deposited on a filter. The flow rate was approximately $5 \text{ m}^3\text{h}^{-1}$. The sampled air was drawn through a 5-mm slit between a 2000- mm^2 alpha CAM PIPS detector and a 1.2- μm pore nitrate cellulose membrane filter. An electronic circuit and a microcontroller processes the detector signal in order to discriminate the energy from the alpha particles. Measurements were done at the ES-MERALDA station in the Research Centre for Energy, Environment and Technology (CIEMAT) premises in Madrid for a period of one week, and in the Institute of Energy Technologies (INTE) premises at the Technical University of Catalonia (UPC) in Barcelona, where is usually located. At both stations the ratios vary with meteorological conditions basically depending on atmospheric turbulence, however their behavior is quite different due to non-uniform radon exhalation rate from soil. In Madrid, spurious high disequilibriums are observed because a radon source is located near the station. When the wind blows from the source, the ^{218}Po concentrations increase significantly while ^{214}Pb and ^{214}Bi do not increase as much. In Barcelona often ratios greater than one are observed and are still under investigation. Finally, one of the applications of the study is that it can explain the background signal in the artificial radioactivity aerosol monitors used in the Spanish radiological surveillance networks (BAI 9850 from the Berthold Company).