



Monte-Carlo Simulation of Radon Equilibrium Under Varying Conditions.

Robin Crockett

Data Analysis and Radon Research Groups, University of Northampton, Northampton, United Kingdom
(robin.crockett@northampton.ac.uk)

Preliminary results of a theoretical investigation into radon equilibrium under a variety of constraints will be presented, e.g. response to metallic daughter plate-out, response to modulation of radon ingress and phase relationship of alpha activity to cyclically modulated radon ingress.

At the core of this investigation is the development of Monte-Carlo simulations of the radon (Rn-222) and thoron (Rn-220) decay chains. Currently, these simulations assume an hypothetical closed cubic metre of atmosphere and the simulations are time-stepped at constant interval. At each time-step, there is a radon or thoron ingress and each nuclei in the decay chains decays probabilistically, with nuclei and activity being aggregated and tabulated at the end of each time-step.

Currently, the simulations have been coded in two open-source interpreted mathematical software packages; Scilab (<http://www.scilab.org>) and Yorick (<http://yorick.sourceforge.net>). This has required that the decay chains are considered sequentially (in reverse order) within each time-step. However, once the simulations are finalised, these will be compiled to run on multi-core/CPU systems allowing the decay chain calculations to be paralleled at each time-step. This will allow much finer time resolution and generation of a larger statistical base from which to draw conclusions.