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Radon transport in fractured porous media – Experimental study in caves

J. Hakl ... G. Górczy

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Abstract

The spatial and temporal variation of ^{222}Rn concentration in three horizontal caves and in one vertical cave was measured to study the influence of different morphological and meteorological parameters on the forming of airborne radon concentrations inside. In horizontal caves, the daily mean radon concentration as a function of the daily average surface temperature showed a step-function type dependence with low winter and high summer values reflecting the main direction of underground airflows. Restriction of airflows increased winter but decreased summer radon levels. The transition pattern between the low winter and high summer values gradually linearized as the number of vertical fractures communicating with the surface increased. Contrary to horizontal caves, in the vertical cave barometric pressure variations played the most important role in controlling subsurface radon concentrations. Decreasing pressure increased radon levels, and increased pressure decreased radon levels. In the pressure-radon correlation

curve, there was a small hysteresis which indicated the nonlinearity of the process.



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