

Radon progeny particle concentration changes in an air-conditioned auditorium

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Radon (Rn) and its progeny (Prog.) constitute harmful pollutants present in the indoor environment. Apart from ionizing radiation, solid heavy metal radon progeny may also have adverse health effects (Duffus, 2002). Until now the research related to the indoor radon concentrations was carried out mainly in naturally ventilated unoccupied premises (Mostafa *et al.*, 2011).

This study provides detailed data on the Rn, Prog. aerosol particle concentration, and the indoor air parameter changes in the occupied and unoccupied air-conditioned auditorium at Lublin University of Technology in Lublin, Poland.

The concentrations of radon and its decay products were measured with the use of AlphaGUARD PQ2000 PRO (Genitron) and EQF3220 (SARAD). The particle mass (PM) and number (PN) concentrations were continuously determined by means of the Dust Trak DRX model 8533 and P-Trak model 8525 (TSI Inc.), respectively. The indoor air parameters were measured using a system Almemo 5690-2M (Ahlborn).

Figure 1 shows not only changes of the concentrations of Rn and Prog. but also of the indoor air parameters in the unoccupied auditorium, when the AC was switched off (AC off) as well as during the classes with students' presence. The AC was switched on during the day and switched off during the night (AC on/off). Higher average Rn and Prog. concentrations were recorded in the auditorium with AC off. The average PN concentrations were the same in both ventilation modes. A positive correlation ($p < 0.001$) has been observed between the Rn concentration and the PN and PM₁ concentrations during the AC on/off mode. A negative correlation has been observed for the Prog. concentration and the indoor air temperature and CO₂ concentration in the AC off mode. The obtained results confirm the importance of the indoor air parameters during the assessment of the radiation hazards related to the presence of radon in air-conditioned premises.

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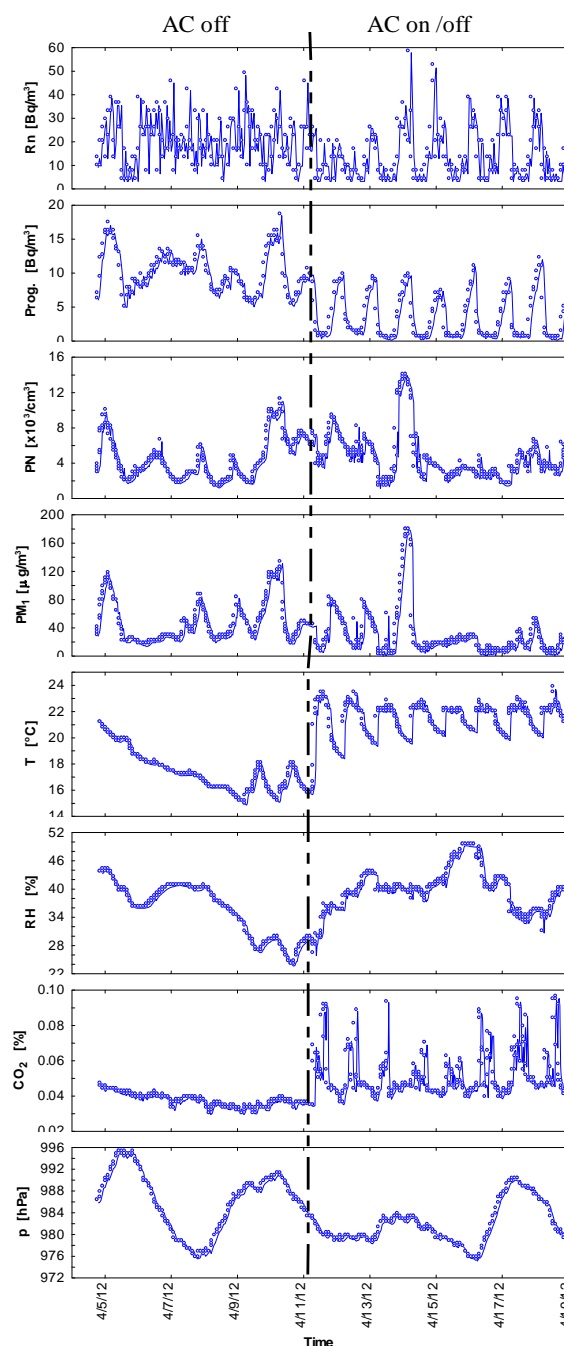


Figure 1. Time series of the concentrations of radon (Rn) and its decay products (Prog.), ultrafine particle number (PN) and mass (PM₁) concentrations, indoor air temperature (T), relative humidity (RH), CO₂ concentration and air pressure (p) changes in the auditorium during the AC off and AC on/off mode.