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Monitoring the inter-season variability in patterns of RF electromagnetic exposure of workers managing a large city park

J. Karpowicz* (1)
(1) Central Institute for Labour Protection – National Research Institute, Warszawa, Poland;
e-mail: jokar@ciop.pl

The urban environment is a complex space with a dense use of sources of various physical factors creating the most complex patters of exposure to noise, vibration and various chemicals, but also electromagnetic radiation (EMR) of various frequencies. Parks are areas of specific environmental properties in the urban environment, where the density of EMR sources is lower, but it is also the case that the infrastructure of parks (such as plants, fountains, ponds, grassy areas, flower beds, etc.) create different EMR propagation conditions than between regular urban objects, as well as variations that are seen with changes in the plants' vegetation or weather conditions. The most popular function of parks seems to be to offer an open space for resting and physical activities. However, the open space of parks also needs to be managed by outdoor workers who are cleaning, cutting the grass and gardening maintenance, watering plants, clearing the snow, etc. Consequently, it is among the important topics of the electromagnetic environmental studies to study the pattern of EMR exposure of such workers.

The aim of the reported study is to look at the spatial distribution and the frequency composition of EMR exposure in parks located in urban areas in the context of inter-season variability (winter, spring, summer and autumn) to evaluate the scale of annual variations in the parameters of exposure and to model the annual exposure of park outdoor workers. The 2-years data collecting in a large city park is on-going – covering already winter and spring of the first year of monitoring. The frequency spectrum of EMR is studied using a spectrum analyzer, and the spatial distribution of exposure is studied using EMR data loggers (pocket size, multi frequency-narrow-band electric field data recorders), which allow walking while variations in the level and frequency composition of EMR to be collected along any area accessible to the researcher equipped with the small measurement device. The characteristics of exposure to EMR collected over the seasons cover the frequencies of typical urban radio communication systems located near the park: mobile phones (downlink signal transmission from the base station to the terminal: LTE 800, GSM 900, DCS/LTE 1800, UMTS/LTE 2100, LTE 2600) and radio and television transmitters (FM, TV VHF/UHF). No new generation networks are yet present around the park covered by monitoring.

The data collection is on-going as is the statistical analysis of the results. The preliminary study has already shown that the frequency composition of EMR exposure in areas of park with various plants is significantly different. It is still to be determined whether the more significant factor is the stage of vegetation (winter – summer) or the location in the park itself (related to the kind of plants around and distances to the nearest EMR radiocommunication transmitters). The next step of the monitoring is planned to be extended to several parks (inside and outside urban areas). The statistical correlation of the EMR exposure pattern and the green infrastructure of parks is also under analysis with respect to evaluating it as a potential physical barrier to EMR, which may help to mitigate EMR in the urban environment where it is not welcome due to any reason.

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