

## Abstract

Restaurants, bars and night clubs are places, where the highest observed levels of respirable suspended particles (RSP) concentration occur. Impact of RSP on human health is well-proved and the most important source of RSP in the indoor air is tobacco smoke.

The aim of this study was to estimate mean concentrations of RSP and their daily variability and to determine mass-size distribution of airborne particles present in the indoor air of the student club "Mrtvá Ryba". By the means of the simultaneous measurement of RSP in the indoor and ambient air, we tried to evaluate the influence of ambient air particles concentrations on the indoor air and I/O ratio with respect to the particle size. Using three different methods: continuous photometer TSI DustTrak (for 104 days), personal cascade impactor sampler (PCIS) Sioutas (SKC) (22 days) collocated both indoors and outdoors and APS (aerodynamic particle sizer) used solely in the bar (5 days), we tried to assess the comparability of the sampling methods in the specific environment with high levels of ETS concentrations.

Average 24h concentration of  $PM_{2,5}$  in the indoor air was  $83,6 (+/- 41,2) \mu g m^{-3}$  while ambient concentration  $20,6 (+/- 6,5) \mu g m^{-3}$ . During the opening hours the average concentration of  $PM_{2,5}$  was  $192,6 \mu g m^{-3}$  (maximum  $1760 \mu g m^{-3}$ ). 62% of airborne particle mass present indoors was in the size class  $< 0,25 \mu m$  (in the ambient air only 38%). I/O ratio for 24h average concentrations varied from 1,13 for particle size class  $1,0 - 2,5 \mu m$  to 5,27 for fine particles  $< 0,25 \mu m$ . Ratio of  $PM_{2,5}$  concentration medians in the indoor and ambient for the entire time span was 5,27.

Linear regression of data obtained by DustTrak and SCIS proved to be well correlated ( $R^2=0,935$ ) but showed significant proportional bias with DustTrak data being overestimated by the factor of 4,88. In the ambient air the correlation found was lower ( $R^2=0,321$ ). 5min mass concentration averages of particles in the size range  $0,523-2,458 \mu m$  obtained by APS correlated well with DustTrak values ( $R^2=0,641$ ). Correlation analyzes rejected the hypothesis about the influence of air humidity and temperature on the indoor air concentrations.

Concentration levels of  $PM_{2,5}$  observed are extremely high and they are of health concern for the consumers in this kind of hospitality. The assessment of accurate indoor  $PM_{2,5}$  concentration may well be done by the use of cheap and easy-to-maintain optical methods, but calibration for the specific airborne particle mass-size distribution or comparison with a reference method is a must when precise absolute data are to be get.