Abstract

This master thesis evaluates the spatial variability of concentrations of PM_{10} on the area of towns Mladá Boleslav, Kosmonosy and small village Plazy during one month in the winter of 2013. Using a network measurements, we tried to determine whether sources of pollution are inside the city, or whether these harmful substances are transferred from the outside of the city to the area of the city. For the measurements we used a set of 9 portable laser nephelometers DustTrak (8520, TSI), which were placed on the roofs of schools. In the same time the device called beta-prachoměr (beta dust-meter) was continuously measuring concentrations of PM_{10}, and we also monitored basic meteorological parameters (temperature, humidity, wind speed and direction). All these parameters were continuously measured at five minutes intervals. Also we did personal walks through the city, during which we measured personal exposure to PM_{10} concentrations. This exposure was compared with exposure of stationary monitors, and finally the differences were quantified.

In Mladá Boleslav and in Kosmonosy, the same trend of concentrations of PM_{10} was observed at all selected locations in the city. Different trend of PM_{10} concentrations was observed in the village Plazy, where the peaks were higher and more frequent, especially in the evening. The main causes of increased concentrations of PM_{10} in the city are automobile transport and local heatings contributing to the urban background. The results also show that the highest concentrations of PM_{10} were observed during days with low wind speeds, due to poor dispersion conditions. Terrestrial measurements confirmed that local heating and transport contribute in the monitored area to increased concentrations of aerosols. It has been proven that the average personal exposure of device measuring during walks is higher than average exposure of stationary monitors. This is caused by the sources of pollution in low heights above ground, which don't impact on stationary monitors in higher heights.

Key words: local heating sources, PM_{10}, urban atmosphere, personal exposure