Abstract

This thesis examines the interactions between ultrafine and fine modes of atmospheric aerosol and precipitation episodes of rain, snow and drizzle. For the research were used data from the period 1.11.2018 to 30.4.2020 at the rural background station Milešovka. It was chosen a combination of a disdrometer together with a Scanning mobility particle sizer spectrometer (SMPS) for the data collection. Ten-minute averages were then used to determine the change in aerosol particle concentration during individual precipitation episodes and to calculate the scavenging coefficient. Then was calculated a Pearson correlation to determine the effect of raindrop size, rainfall intensity, temperature, relative humidity and wind speed on the decrease in aerosol concentration by individual hydrometeors. Finally, a cluster analysis of the air mass history was performed.

An assessment of the change in aerosol particle concentration during each event showed that although all three selected hydrometeors contributed to the decrease in particle concentrations, only rain caused a decrease in all size classes (-5,7%). The result of the scavenging coefficient estimation further confirmed the higher success of rain, with a median coefficient of 6,62 x 10^{-4} s^{-1}. The atmospheric cleaning by rain then proceeded best between droplet size 0,125 – 3 mm and particles in the 100 - 140 nm size range. In the analysis of the effect of intensity on the decrease of aerosol particles, significant negative correlations were found only for rain (10-20 and 200-800 nm) and drizzle (50-200 nm).

The measurements provided additional results to existing, primarily foreign, studies on below cloud scavenging. This work comes with similar results to Zíková & Ždímal (2016) and can thus support the characterization of atmospheric scavenging in the background locations of Central Europe. The results can be further used in the development of climate models.

Key words: hydrometeors, disdrometer, SMPS, atmospheric aerosol, vertical wet deposition