Predictability Analysis of PM10 Concentrations in Budapest

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Climate, weather and air quality may have harmful effects on human health and environment. Over the past few hundred years we had to face the changes in climate in parallel with the changes in air quality. These observed changes in climate, weather and air quality continuously interact with each other: pollutants are changing the climate, thus changing the weather, but climate also has impacts on air quality. The increasing number of extreme weather situations may be a result of climate change, which could create favourable conditions for rising of pollutant concentrations.

Air quality in Budapest is determined by domestic and traffic emissions combined with the meteorological conditions. In some cases, the effect of long-range transport could also be essential. While the time variability of the industrial and traffic emissions is not significant, the domestic emissions increase in winter season. In recent years, PM10 episodes have caused the most critical air quality problems in Budapest, especially in winter.

In Budapest, an air quality network of 11 stations detects the concentration values of different pollutants hourly. The Hungarian Meteorological Service has developed an air quality prediction model system for the area of Budapest. The system forecasts the concentration of air pollutants (PM10, NO_2, SO_2 and O_3) for two days in advance. In this work we used meteorological parameters and PM10 data detected by the stations of the air quality network, as well as the forecasted PM10 values of the air quality prediction model system.

In this work we present the evaluation of PM10 predictions in the last two years and the most important meteorological parameters affecting PM10 concentration. The results of this analysis determine the effect of the meteorological parameters and the emission of aerosol particles on the PM10 concentration values as well as the limits of this prediction system.