

# The Effect of Meteorological Conditions on PM<sub>10</sub> Concentrations in Budapest

Zita Ferenczi

Hungarian Meteorological Service, P.O.Box 39, H-1675 Budapest, Hungary  
Tel:+36-1-3464821, ferenczi.z@met.hu

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: the pollutants are changing the climate, thus changing the weather, but the climate also has impacts on air quality [1]. The increasing number of extreme weather situations may be a result of climate change, which could create favourable conditions for rising of pollutant concentrations.

The 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 be also essential. While the time variability of the industrial and the traffic emissions is not significant, the domestic emissions increase in winter season.

In recent years, the PM<sub>10</sub> episodes have caused the most critical air quality problems in Budapest, especially in winter. In this work, the effect of meteorological conditions on PM<sub>10</sub> in Budapest was analysed in detail.

In Budapest, an air quality network of 11 stations detects the concentration values of different pollutants hourly. In this work, we have used the meteorological and air quality data detected at Gilice station, a member of this monitoring network.

Detailed analyses of smog situations are presented here, where these episodes are divided into two groups based on the cause of the high concentration: due to the meteorological situation, or due to the increased emissions of air pollutants. These "emission" and "weather" smog situations were further analysed and for the "weather" smog situations the effect of all available meteorological variables on PM<sub>10</sub> concentrations were evaluated [2], [3]. It was found that the most important variables affecting PM<sub>10</sub> concentration in winter are temperature, wind speed and mixing layer height.

[1] S.M. Bernard, J.M. Samet, A. Grambsch, K.L. Ebi and I. Romieu, The Potential Impacts of Climate Variability and Change on Air Pollution-Related Health Effects in the United States, *Environmental Health Perspectives*, **2001**, *109*, 199-209.

[2] I. Barmpadimos, C. Hueglin, J. Keller, S. Henne, and A. S. H. Prévôt, Influence of meteorology on PM<sub>10</sub> trends and variability in Switzerland from 1991 to 2008, *Atmos. Chem. Phys.*, **2011**, *11*, 1813-1835.

[3] K. M. Mok and K. I. Hoi, Effects of meteorological conditions on PM<sub>10</sub> concentrations - A study in Macau, *Environmental Monitoring and Assessment*, **2005**, *102*, 201-223