Influence of stable weather on aerosol concentration and size distribution at K-puszta, Hungary

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Living in the Anthropocene, among the Earth-system processes climate change is already beyond our planetary boundaries (Rockström *et al* (2009). Changing climate leads to changes in the frequency, intensity, temporal and spatial extent of extreme weather and climate events (IPCC, 2012). Some of these extreme events – e.g. heat waves, droughts – are frequently connected to high atmospheric stability that inhibits the vertical and horizontal mixing of the air in the lower troposphere.

It is well known that physical characteristics of the atmosphere (meteorological parameters) can significantly affect the air quality. In summer the high pressure weather systems may lead to deterioration of air quality resulting in very high concentrations of atmospheric trace constituents. On the other hand, air pollution episodes can also be formed in winter due to persistent stable weather. These episodes can cause serious air pollution mainly in urban environments; however, persistent anticyclones with large spatial extent can result in high level of air pollutants even in regional background air.

Beside ground level ozone, aerosol particles play an important role in air pollution episodes with special regard to their adverse health effects (IPCC, 2012). The number and mass concentration, as well as the size distribution of the particles are the most important parameters which affect significantly the human respiratory system; and their ecological influence due to aerosol deposition is also important.

In this work the change in aerosol size distribution and dry deposition velocity is studied as a function of weather conditions in background air. We focus mainly on the changes of aerosol size distribution under stable atmospheric conditions both in summer and winter.

The aerosol size distribution has been monitored at K-puszta, Hungary between 2010 and 2012. The weather in 2010 was rather changeable with extremely high amount of precipitation, while 2011 and 2012 were excessively dry and warm resulting severe drought and heat-waves. For the selection of periods with stable weather conditions, meteorological data (temperature, precipitation, air pressure) (Hungarian Meteorological Service) and the synoptic weather maps (www.met.hu) are evaluated.

Aerosol data are obtained by means of DMPS and ELPI samplers. The size distribution of the particles between 3-800nm as well as in the size range of 30nm and 10.8μm is monitored by the DMPS and ELPI, respectively.

The aerosol size distribution is controlled by a number of different processes as new particle formation, condensation and coagulation, cloud and photochemical ageing processes, hygroscopicity, etc. In this work the results of these complex processes are discussed in detail.

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