

Characterising Seasonal Variations and Spatial Distribution of Ambient Particulate Matter Concentrations in Turkey

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Extended Abstract

Spatial and temporal variations of particulate matter (PM) and factors affecting these variations in Turkey from the year 2008 to the end of 2015 are investigated in this study. As of 2015, there are more than 200 air quality monitoring stations exist in Turkey. The PM characteristics (PM10 and PM2.5) were identified according to three main stations types; industry, curbside, residential and urban background stations.

The PM10 levels (annual mean) ranged from 11 to 120 $\mu\text{g}/\text{m}^3$ at industry sites, 17 to 39 $\mu\text{g}/\text{m}^3$ at urban background sites, from 12 to 143 $\mu\text{g}/\text{m}^3$ at residential sites and 44 to 106 $\mu\text{g}/\text{m}^3$ at curbside sites. PM2.5 levels were ranging from 16 to 56 $\mu\text{g}/\text{m}^3$ at residential sites and 27 to 55 $\mu\text{g}/\text{m}^3$ at curbside sites.

Analysis of collocated parallel measurements of PM2.5 and PM10 were conducted. And it has been found that, the PM2.5/PM10 ratio is highly dependent on the types of site and season and varied from 0.28 to 0.50 with a mean of 0.40. The PM2.5/PM10 ratio in European cities generally in the range of 0.6 to 0.8, indicating majority of the particulate mass is in the fine fraction, whereas majority of particulate mass is in the coarse fraction in Turkey. In many areas of the country, PM10 and PM2.5 are related since most of the PM10 is contributed by PM2.5. Evaluating the PM10-PM2.5 relationships provides information on PM2.5 concentrations in areas not monitored for PM2.5.

There is an improvement of PM levels in Turkey. The annual mean reduction of PM10 levels all over Turkey is around 5.9 $\mu\text{g}/\text{m}^3$ and for PM2.5 it is 1.8 $\mu\text{g}/\text{m}^3$. Relation between annual mean concentration and 36th highest daily average concentration in Turkish AQM Stations examined and it is find that the limit on annual mean of 50 $\mu\text{g}/\text{m}^3$ is well represented by a daily exceedences limit of 85 $\mu\text{g}/\text{m}^3$.

State of PM levels of Turkey is determined through comparison with air quality data generated in other countries and available air quality standards. Based on this comparison, although air quality has improved in recent years, many of Turkish cities have been facing severe difficulties to attain the PM limit values. Although measured concentrations of pollutants mostly comply with standards in the Turkish Air Quality Regulation, further reduction in concentrations will be necessary, when EU directives become effective in the country. As the EU is currently revising its air quality legislation and planning new national emission reduction commitments for 2030, the question arises how compliance will evolve under different policy scenarios. The existing PM2.5 network is sparse and it is difficult to establish even the gross features of PM2.5 concentrations over the Turkey.