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A Decadal Spatial and Temporal Analysis of PM10 in Istanbul: 1998-2008

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This study provides valuable new insights into the key contributors to ambient air quality in Istanbul, one of the largest mega-cities in Europe. The study builds on work in Europe that links air quality with national dynamics such as economical, vehicle activity and, meteorology in the long-term.

Spatial and temporal analysis was performed on PM10 levels measured at 10 air quality monitoring stations (AQMSs) in Istanbul from 1998 to 2008. The analysis found that ambient air quality levels are linked with winter temperatures as well as economic activity. The mean annual PM10 levels in 2001 are among the three lowest years in the period. This decrease corresponds with daily temperature data and annual number of heating degree days which shows that 2001 was one of the warmest winters in Istanbul. Warmer temperatures led to a decrease in energy demand for heating purposes, as demonstrated by the coal sales data. Low ambient air quality levels in 2001 also correspond to a decrease in gross domestic product and electricity demand due to the national economic crisis in March 2001 which affected industrial activity and as a result industrial and energy production related emissions.

The study also found that air quality levels in Istanbul are a threat to human health and the environment. Based on the annual and seasonal PM10 profiles of the stations, 5 of the 6 AQMSs in the European Side of the city had mean PM10 values above the EU limit for PM10 for over 50% of the time. According to the linear regression analysis, there is no significant increase or decrease in the annual PM10 trend in Istanbul, this may be due warm winter and economic crisis in 2001.