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PM1 levels are related to CO concentrations and health impacts in the city Athens Greece

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Abstract

Senekas, as early as 60 A.D., was the first to refer to air pollution and the possibility of imposing restrictions in Rome. In 1307, during the reign of Edward I, legislation was introduced to prevent the use of sea coal in kilns and limeburners in London. In the 19th century the first problems arising from elevated levels of smoke in cities appear. By 1930, Pittsburgh Pennsylvania suffered from heavy smoke pollution and the 1952 London smog episode stands out as one of the worst pollution disasters given the number of people who died as a result. Mega city pollution has become a serious problem to human health and in an effort to analyze and mitigate this threat, the European and worldwide scientific communities are, at present, placing considerable time, effort and resources in the field. It is well known that vehicle related NOx and CO emissions represent the main public health hazard (cardiovascular and respiratory syndromes) in the main industrialized cities of Europe with high traffic volumes. The objective of this study is to analyze the spatial distribution of PM1, CO and the related health impacts within the greater Athens area (GAA). Several portable and ground based detectors were employed for the PM and CO measurements, capable of detecting CO levels in the ambient environment, up to 1000 ppm. Sampling took place on road sidewalks at a specified hour every morning to coincide with the peak in vehicle traffic. Controls were performed with no traffic and compared to normal traffic days and days with extreme traffic congestion, which included PM and CO concentration measurements. In addition, in order to monitor potentially related health impacts, daily admissions to the Emergency Departments of the Social Security Institute and Regional Hospitals of Athens were recorded. Results demonstrate a significant correlation between both PM1 and CO and particulate matter symptomatology, such as dispnea, fatigue, headache, dacryrrea and dry cough. These findings confirm previous studies which indicate that, in European cities with high traffic volumes and elevated exhausts emissions, CO represents one of the main hazards resulting in cardio respiratory syndromes. Our preliminary results indicate that increased PM1 levels correlate to increased CO levels and suggest that this correlation which is stronger than that for SO2 and NOx, may explain the increased health impacts observed. This paper presents the findings and data collated from in situ measurements and discusses future research studies aiming at investigating the effects of the above measured pollutants on public health in cities facing similar traffic conditions.