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Cardiovascular admissions related to particulate matter from 2.5μm to 80μm in Heraklion, Crete Island, Greece

Anastasia Bleta (1), Panagiotis T. Nastos (1), Kyriakoula Papachristopoulou (1), and Volker Dietze (2)

(1) National and Kapodistrian University of Athens, Geology and Geoenvironment, Climatology and Atmospheric Environment, Kaisariani Athens, Greece (ableta@geol.uoa.gr), (2) German Meteorological Service (DWD), Research Center Human Biometeorology, Air Quality Department, Freiburg, Germany

The air quality is being degraded by airborne particles, exacerbating the human health. Air pollution is an important public health issue, causing cardiovascular and pulmonary diseases worldwide. This study examines the possible association between particulate matter classes with geometric diameter between 2.5μm and 80μm and hospitalization due to cardiovascular diseases in Heraklion, Crete Island, Greece.
Weekly meteorological variables as temperature, relative humidity, wind speed and mean radiant temperature (Tmrt) were obtained from meteorological station in Heraklion. Throughout the study period, 15970 cardiovascular admissions were recorded, which divided in two groups, by gender and age. Myocardial infarction, ischemic attacks, angina pectoris, coronary cardiovascular disease, cardiomyopathy, heart failure, cardiac dysrhythmia, endocarditis, and myocarditis were identified as cardiovascular disease based on ICD-9 codes. Generalized Additive Models (GAM) were applied to investigate the association of weekly counts of outpatients with cardiovascular admissions against ambient particulate pollutants, after controlling for possible confounders and nonlinear variations.
Our study focuses on Crete Island because it is located in the south most border of East Mediterranean basin, facing exacerbating atmospheric conditions (mainly high PM concentrations) due to Saharan dust outbreaks. It is worth to note that these episodes are more frequent during spring and autumn, when mild biometeorological conditions become intolerable due to the synergy of the so called Föhn winds. Föhn winds have been associated with increased irritability, headaches and heart problems.
The increased levels of all sizes of PMs are related with a decrease in cardiovascular admissions, which is not statistically significant. However, only PM2.5-5 appeared to have a positive impact (statistically significantly at $p<0.1$) on the total cardiovascular admissions, while the greater sizes of PMs seem not to be effective on hospitalizations. All classes of PMs' sizes are not statistically significant with male's cardiovascular admissions. On the contrary, it was found protective relation between women's cardiovascular admissions and air pollution, which is statistically significant for PM2.5-20 aerosols. In addition, young patients (age$\leq$35 years) demonstrate protective relation between cardiovascular admissions and different sizes of pollutants, which is statistically significant for PM2.5-20 aerosols. The GAM modelling explains 61.5% of the data variability, according to the criteria for the chosen degrees of freedom per each smoothed model term, indicating that also other factors are influencing the cardiovascular admissions variability, such as non-environmental ones (patients's social-economic and health condition).