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Quantification of the Impact of Air Pollution on Human Health and Economy in Turkey using the EVA System

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Today, many scientific studies have proven the strong relationship between air pollution and human health. Turkey is one of the most rapidly-developing countries with its growing economy, industry, and population. Therefore, air pollution can exceed the limits, especially in the winter months. Cardiovascular, respiratory and other air-pollution-related diseases pose a major threat to human health due to increasing emissions in Turkey. According to the European Environment Agency (EEA), 97.2% of the urban population in Turkey is exposed to unhealthy levels of particulate matter (PM). According to EEA, Turkey also emerges as a country with one of the highest rates of premature deaths (28,924) due to air pollution in Europe from ambient PM and ozone exposure. The indirect impact of air pollution on the economy in terms of health can be billions of dollars. For these reasons, it is very important to calculate the contribution of pollution sources to the level of air pollution and the economic loss caused by the resulting adverse health effects.
In this study, the effect of air pollution on human health including both morbidity and mortality and their cost to the economy will be calculated for the first time covering all of Turkey. Economic Valuation of Air Pollution (EVA) model, which is coupled with the Danish Eulerian Hemispheric Model (DEHM) will be used. DEHM is an offline atmospheric chemistry and transport model, developed to investigate the long-range transport of air pollutants in Europe and the northern hemisphere. In this study, DEHM uses the EMEP inventory and the WRF mesoscale weather prediction model outputs. EVA is based on the impact-pathway chain, to assess the health-related economic externalities of air pollution resulting from specific emission sources or sectors, which can be used to support policymaking with respect to emission control. EVA uses pollutant concentrations as input along with population densities, exposure-response functions. Main emission sources, which are defined by the 10 SNAP categories in Turkey, will be used to estimate the economic loss linked to health problems with using the EVA modeling system. The model simulation consists of three nested domains: coarse domain with a resolution of 150 km covers the northern hemisphere, the second domain with a resolution of 50 km for Europe and third domain with 16.7 km resolution covers Turkey.