Geophysical Research Abstracts
Vol. 21, EGU2019-927, 2019
EGU General Assembly 2019

Present and Future Impacts of Fine Particulate Matter on Human Health in non-linear functions over Europe

Patricia Tarín-Carrasco (1), Ulas Im (2), Laura Palacios-Peña (1), and Pedro Jiménez-Guerrero (1)

(1) Murcia, Faculty of Chemistry, Physics, Murcia, Spain (patricia.tarin@um.es), (2) Aarhus University, Department of Environmental Science, Frederiksborgvej 399, DK-4000, Roskilde, Denmark

The impact of air pollution on human health has been widely studied and established in the last few decades. This study focuses on the fine particulate matter (PM2.5) exposure due to the widespread effects of this pollutant: PM2.5 can damage different organs such as lungs, heart, brain; and can lead to premature death. The number of premature deaths from Lung Cancer (LC), Chronic Obstructive Pulmonary Disease (COPD), Ischaemic Heart Disease (IHD) and Stroke (ST) due to PM2.5 exposure have been studied for present (1991-2010) and future (2031-2050) climate change scenarios by using the WRF-Chem online-coupled meteorological/chemistry model in framework of the Spanish REPAIR and ACEX Spanish projects, operated over an Euro-CORDEX compliant simulation domain. The differences between these two scenarios provide the changes in future air quality. In order to isolate the climate change impact on air quality, (1) unchanged anthropogenic emissions from ACCMIP have been used; and (2) the population has been kept constant for the year 2005.

The novelty of this work is that we use both linear and non-linear exposure-response functions to estimate the impacts of pollution on premature mortality. We estimated non-linear exposure-response functions following Lelieveld et al. (2015) and Liang et al., (2018). Hence, this study tries to assess the present and future (under the RCP8.5 scenario) premature death due to LC, COPD, IHD and ST in Europe due to exposure to ambient PM2.5. The risk ratio and the base line mortalities for each pathology for different age ranges (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, +80 and all ages) have been estimated and this data was obtained from Institute for Health Medicine (IHME).

The results show that IHD is the leading pathology resulting in the highest number of premature deaths for a present climate on Europe. Each pathology presents different sensitive population depending on its age range. The result obtained in this work are quite different compared to the result obtained for linear exposure-response functions (e.g. Im et al., 2018). Despite marked regional differences, overall, the pathologies included in this study will increase in the future period under a changing climate.