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Country-to-country exchanges of PM_{2.5} related mortality over the Mediterranean

Dimitris Akritidis^{1,2} and **Andrea Pozzer**^{2,3}

¹Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki, Thessaloniki, Greece (dakritid@geo.auth.gr)

²Max Planck Institute for Chemistry, Atmospheric Chemistry Department, Mainz, Germany

³Climate and Atmosphere Research Center, The Cyprus Institute, Nicosia, 1645, Cyprus

Fine particulate matter (PM_{2.5}) is detrimental to human health. Long term exposure to ambient PM_{2.5} is associated with excess mortality from respiratory, cardiovascular, and other non-communicable diseases. The mixture of anthropogenic and natural aerosols, as well as the prevailing atmospheric conditions, make the broader Mediterranean region one of the most polluted areas around the world. The national anthropogenic emissions and demographics, as well as the atmospheric pollution transport pathways shape the import and export of PM_{2.5} and associated mortality in a country level. Here, we perform an assessment of the anthropogenic PM_{2.5} related excess mortality exchanges between countries of the broader Mediterranean region using the chemistry general circulation model EMAC (ECHAM5/MESSy for Atmospheric Chemistry) and the GBD (Global Burden of Disease) 2019 methodology for the mortality calculations. The EMAC simulations are carried out in a T106 horizontal resolution (equivalent to 1.1 x 1.1 degree at the equator) for the year 2015, nudged towards the ERA5 dynamics, and following a zero-out approach (turn-off) for the CEDS (Community Emissions Data System, 2020-v1) anthropogenic emissions of each country. The results indicate that the hot spot countries of anthropogenic PM_{2.5} related mortality import and export are mainly driven by the countries' population and emissions, respectively, and their relative location.

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