ATTACH: ATTributing heAt-related excess mortality and morbidity to Climate cHange (2021-2025)

Short summary:
The goal of this project is to quantify to what extent anthropogenic climate change has already increased heat-related mortality and hospitalizations in Germany over recent decades. It employs a recently developed approach to derive climate counterfactuals, mimicking a world without climate change, from century-long observational temperature records. The epidemiological models, established with time-series regression methods, are differentiated by cause, age, and sex.

Long summary:
Climate change is known to affect deaths and hospitalizations associated with heat exposure in Europe. Yet, despite a broad epidemiological knowledge base on the future impacts of climate change, few studies so far have formally attributed heat-related mortality and morbidity to climate change that has already occurred over the past century. ATTACH contributes to the closing of this important research gap, with a special focus on recent European heatwaves. The project makes use of death count and hospitalization statistics from major cities in Germany, and combines state-of-the-art epidemiological approaches with an innovative approach to climate impact attribution. This novel approach derives counterfactual climate data, mimicking a world without climate change, from detrended observations.

Specific objectives:
1) Determine heatwave-related excess mortality in 15 major German cities during the period 1993 to 2016, and quantify the contribution of past-century climate change to the estimated excess mortality. This analysis will differentiate between age groups, sex, and causes of death.
2) Assess warm-season associations between heat and cause-specific hospitalizations in 15 major German cities during the period 2000 to 2016, and determine the contribution of past-century climate change to the magnitude of observed heat-attributable hospitalizations. The analysis will account for effect modification by ambient air pollution.

Study design:
Epidemiological models: Time-series regression models including distributed lag non-linear models. Meta-analytical methods to pool city-specific results and to study longitudinal changes.
Climate data: century-long temperature records from measurement stations combined with novel detrending methods to construct climate counterfactuals

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Ongoing
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