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Avoided and potential air pollution levels and health impacts: The 2003 European heat wave as an exemplar extreme event

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Over 70,000 people died in Europe during the 2003 heat wave, as a result of both elevated air pollution levels, due to the stagnant atmospheric conditions, and extreme temperatures. By the end of this century, heat waves over Europe are expected to increase in intensity and duration. Given a "business as usual" scenario, the number of hot days in central Europe are projected to be similar to those recorded in southern Europe in the present day.

Such extreme events present a challenge for policy efforts to limit poor air quality. If their likelihood does indeed increase they could result in more days with air quality in exceedance of health limits, even if pollutant emissions do not change (the “climate penalty”). We will argue that historical extreme events provide an excellent test for the effectiveness of air quality policies on the air pollution levels they seek to control. These events are both a putative “worst case scenario” as well as being tangibly grounded in lived experience, unlike using climate model projections.

We will present results from a set of global chemistry climate model (CCM) simulations to explore the European air quality levels in the meteorological background of the 2003 European heatwave. Our simulations estimate the beneficial impact of air quality policy between 1970 and 2003 (the “world avoided”), and consider two alternative future pollution emission scenarios.