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Quantifying the attributable impact of the February 2018 sudden stratospheric warming on mortality in the Nordics and United Kingdom

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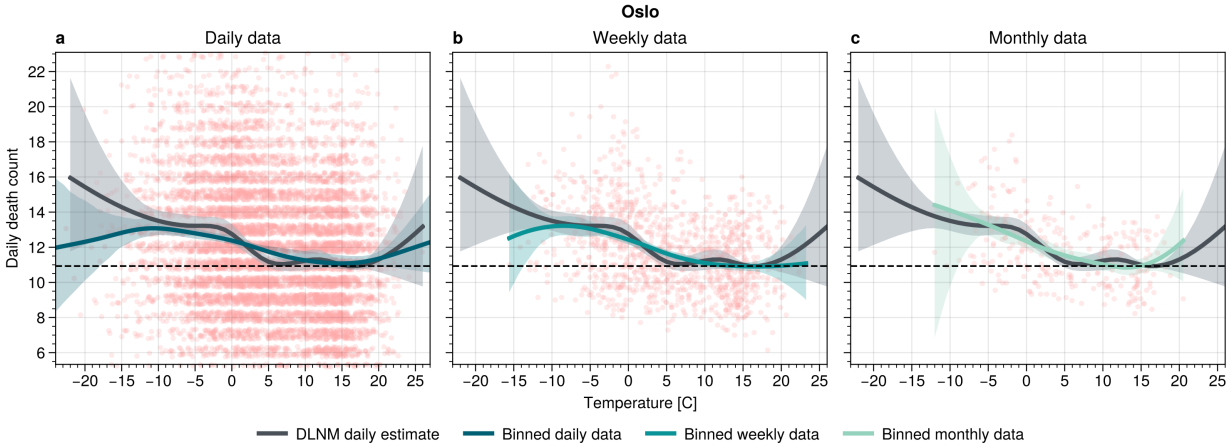


Figure S1: Exposure-response curves for Oslo based on input data as (a) daily, (b) weekly and (c) monthly average. Red dots show death counts versus temperature distribution at the corresponding temporal resolution. Lines show the exposure-response curves using the DLNM or binning approach, with shading indicating the 95% confidence interval. The DLNM line is the same in every panel and is based on daily data only. Horizontal dashed lines indicate the MMT base death count. Some small scale noise is added to daily death counts in (a) to improve the visualisation of discrete data.

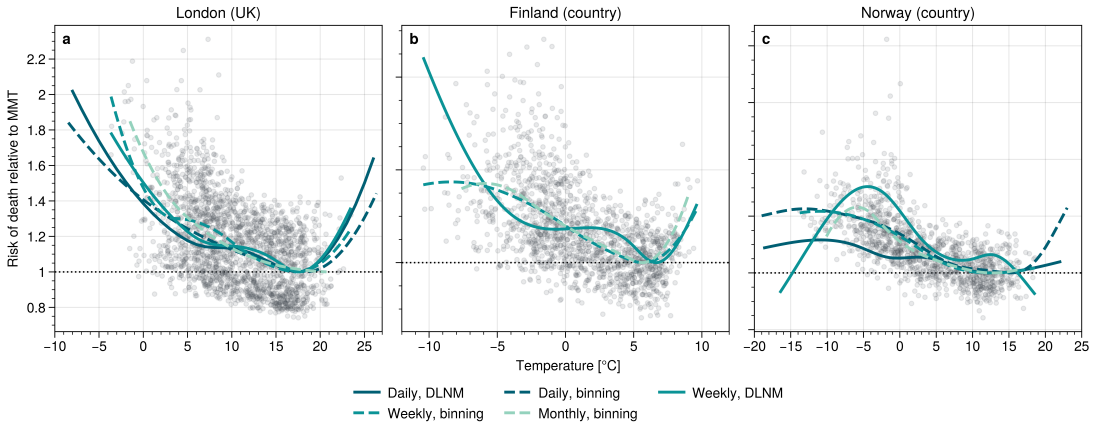


Figure S2: Comparison of exposure-response curves for (a) London, (b) Finland and (c) Norway. Different lines use different model approaches (DLNM or binning) and are based on underlying data with different temporal resolution (daily, weekly, monthly). All curves normalised to 1 at the respective MMT. Scatter points show death counts divided by death counts at the MMT (based on daily deaths for London and weekly deaths for Finland and Norway).

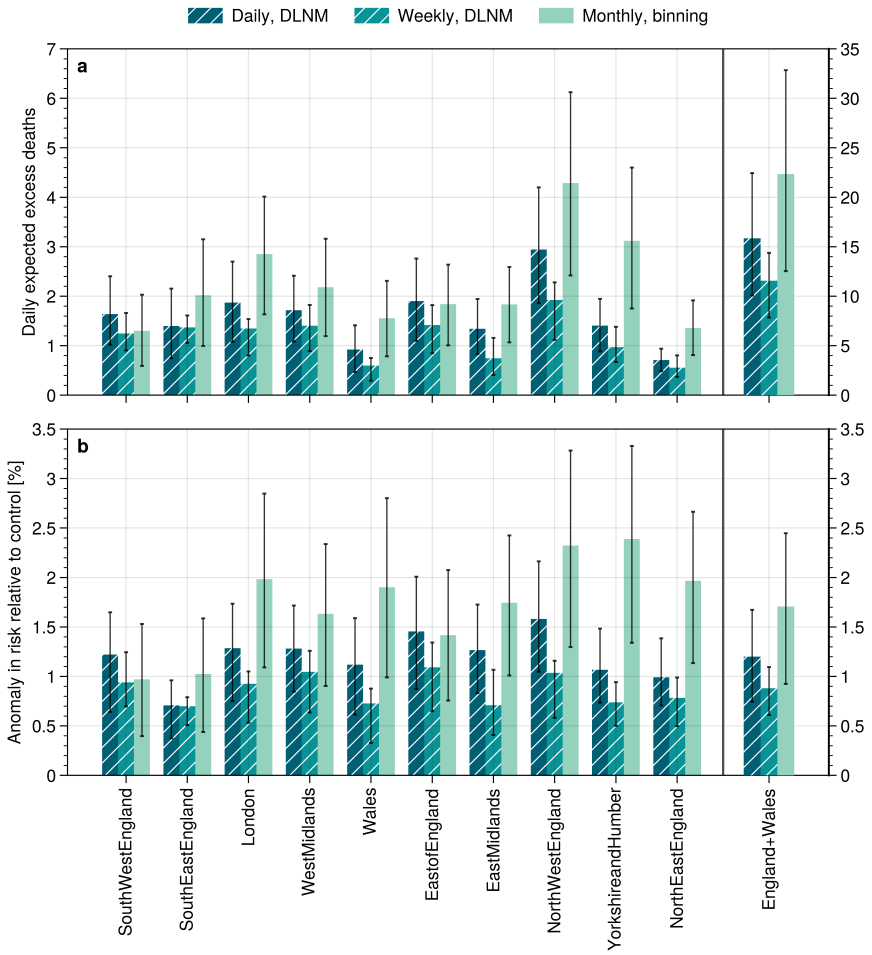


Figure S3: Same as Figure 10 in the manuscript, but for selected model and temporal resolutions only. Uncertainty bars show 10th and 90th percentile of bootstrapped MMMs for all possible 5-model combinations to indicate inter-model spread.

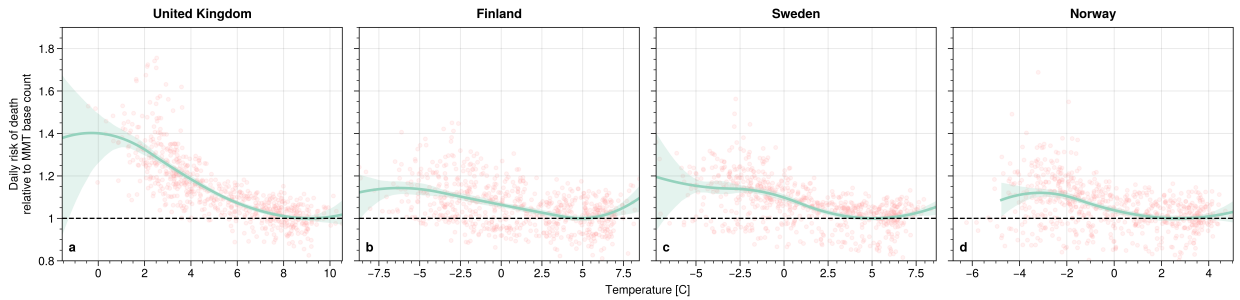


Figure S4: Exposure-response curves showing temperature as monthly means and associated mortality risk for different countries based on the EuroStats dataset. Shading indicates the 95% confidence interval. Red dots show the same-month relationship (i.e. without lag) of temperature and mortality, where death count is normalised by the value at the MMT.

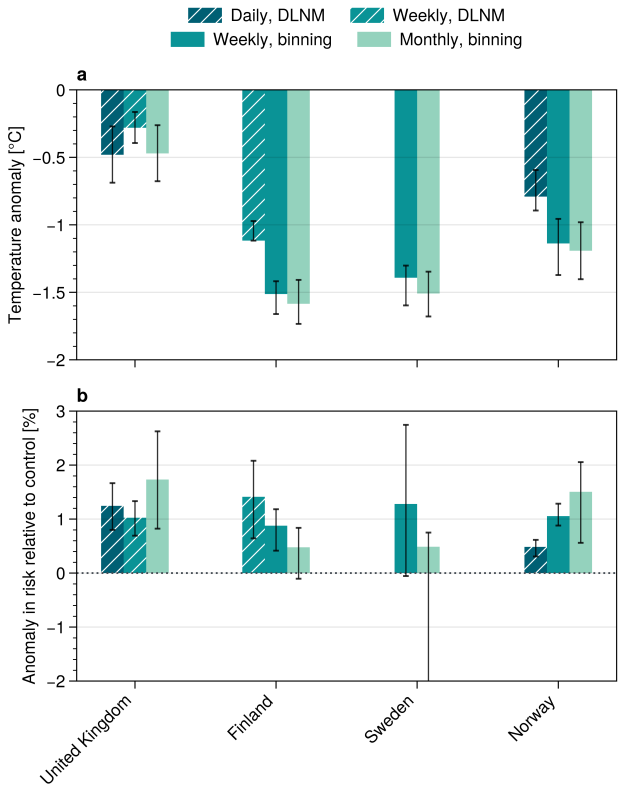


Figure S5: Same as Figure 12 in the manuscript, but for selected model and temporal resolutions only. Uncertainty bars show 10th and 90th percentile of bootstrapped MMMs for all possible 5-model combinations to indicate inter-model spread.

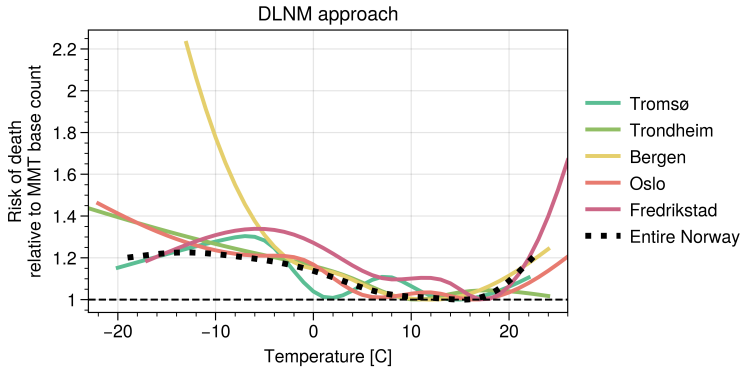


Figure S6: Exposure-response curves for mortality risk as function of temperature for different cities in Norway based on the DLNM approach. Regions are roughly sorted from North (colder colours) to South (warmer colours). The x-range of each curve is determined by the observed range of temperature values. Dashed line gives mortality model based on country-level data for entire Norway.

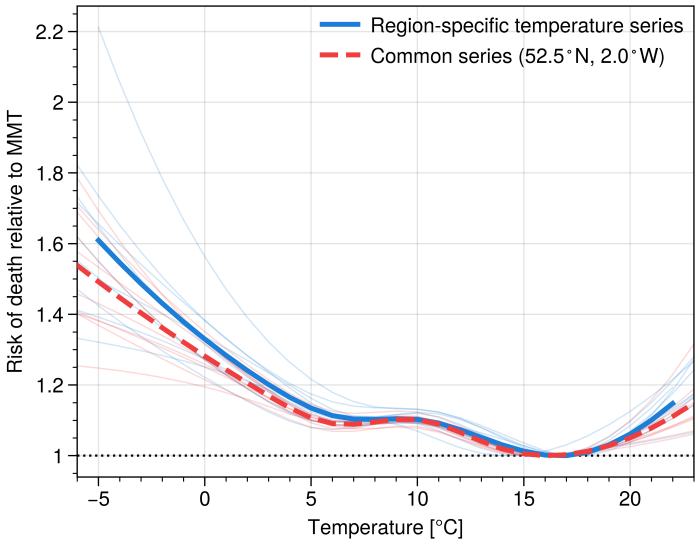


Figure S7: Pooled exposure-response curves for England and Wales, obtained by fitting each of the ten regional mortality records against either its own local temperature series (blue) or a single common series taken from the centre of England and Wales at 52.5°N, 2°W (red, dashed). Thin lines show the individual regional curves, thick lines the death-count-weighted mean across regions. All curves are normalised to 1 at their respective MMT.

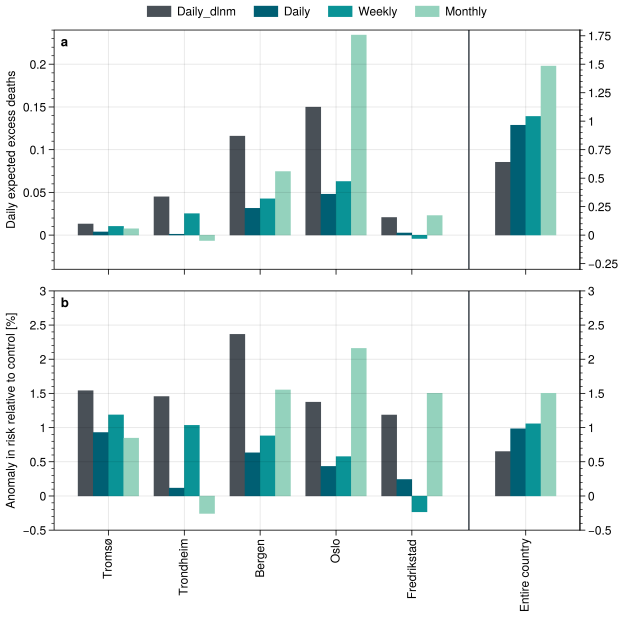


Figure S8: Attributable SSW impacts on mortality for different Norwegian regions. Shown are (a) the daily excess deaths and (b) the relative risk anomaly, both estimated as MMM difference between nudged and control experiments and averaged over the 30 days following the SSW onset. Different bars are based on different exposure-response models, with the DLNM using daily input data and binning approach using daily, weekly, or monthly data. Total death rates for and risk anomaly are computed separately based on country-level data for Norway.