

Figure S1: The domain sum of CAMS annual emissions for NOx, CO, NMVOC, NH_3 , SO_2 and PM2.5 for 2010-2018 in Tg. The orange dots highlight the 2015 emission value used in this study.

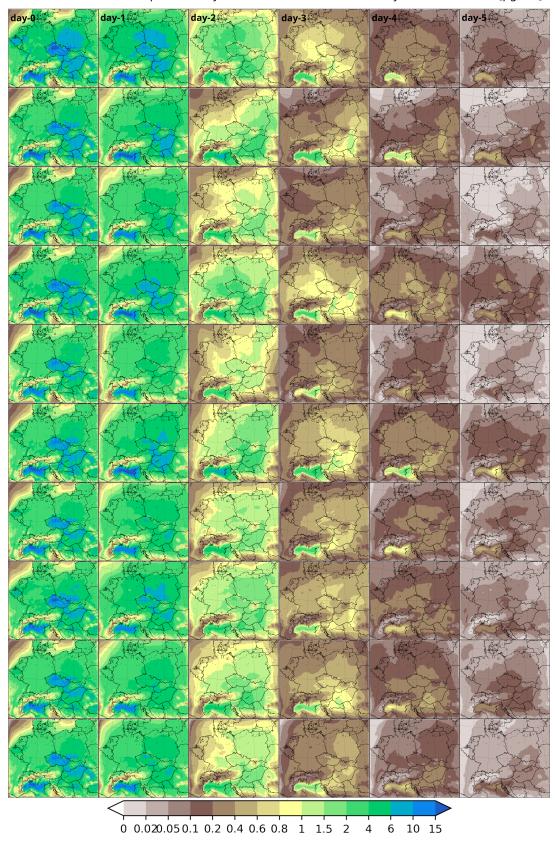


Figure S2: The absolute DJF contribution of emission from day-0 to day-5 (from left to right) and for years 2010 to 2019 (from top to bottom) to PM2.5 concentrations in μgm^{-3} .

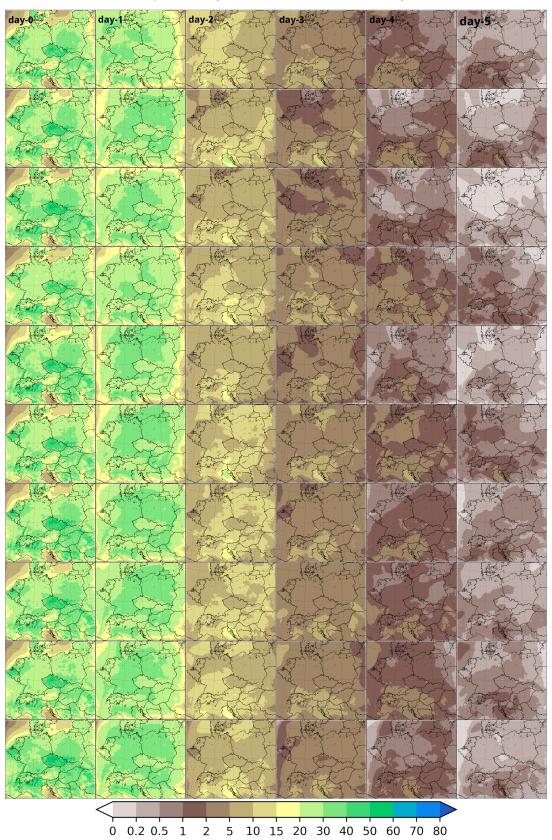
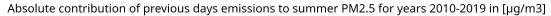


Figure S3: The relative DJF contribution of emission from day-0 to day-5 (from left to right) and for years 2010 to 2019 (from top to bottom) to PM2.5 concentrations in %.



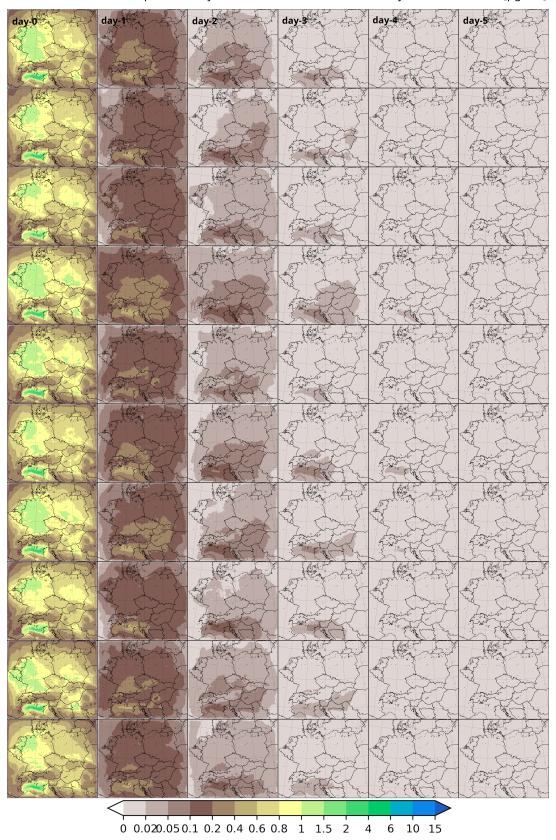


Figure S4: The absolute JJA contribution of emission from day-0 to day-5 (from left to right) and for years 2010 to 2019 (from top to bottom) to PM2.5 concentrations in μgm^{-3} .

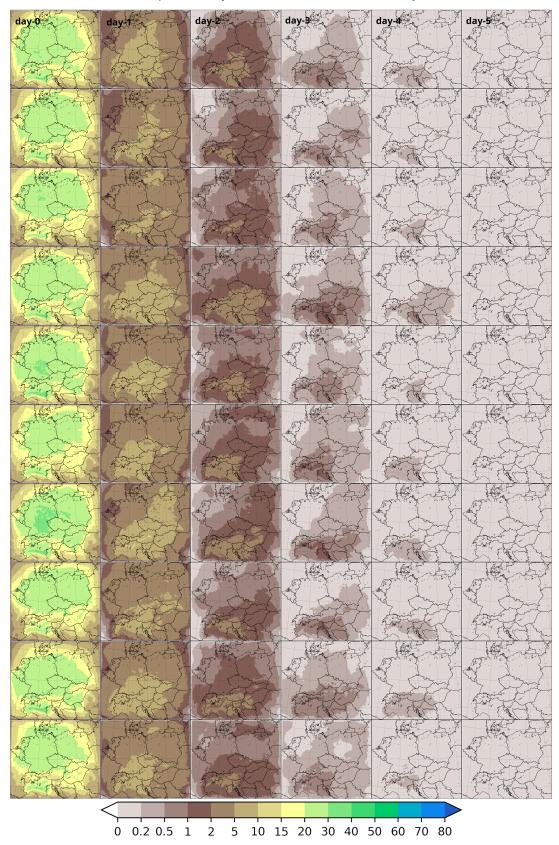


Figure S5: The relative JJA contribution of emission from day-0 to day-5 (from left to right) and for years 2010 to 2019 (from top to bottom) to PM2.5 concentrations in %.

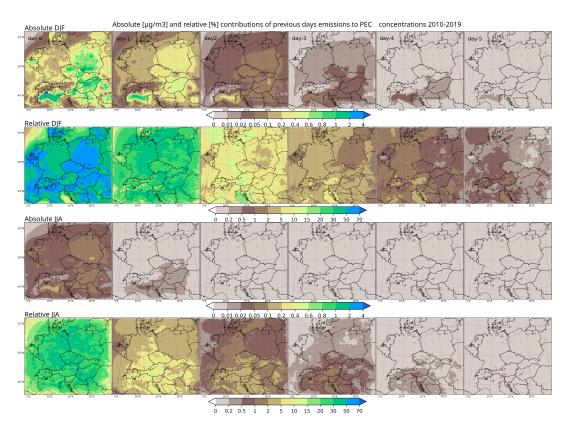


Figure S6: The absolute (1st and 3rd row) and relative (2nd and 4th row) contributions of emissions of the actual and previous days emissions to the 2010-2019 DJF and JJA (upper two and lower two rows, respectively) average near surface primary elemental carbon (PEC) concentrations. Columns stand, from left to right, for the contribution of the actual day (day-0) and previous days (day-1 to day-5). Units are $\mu g m^{-3}$ for the absolute and % for the relative contributions

Relative contribution of previous days emissions for individual cities

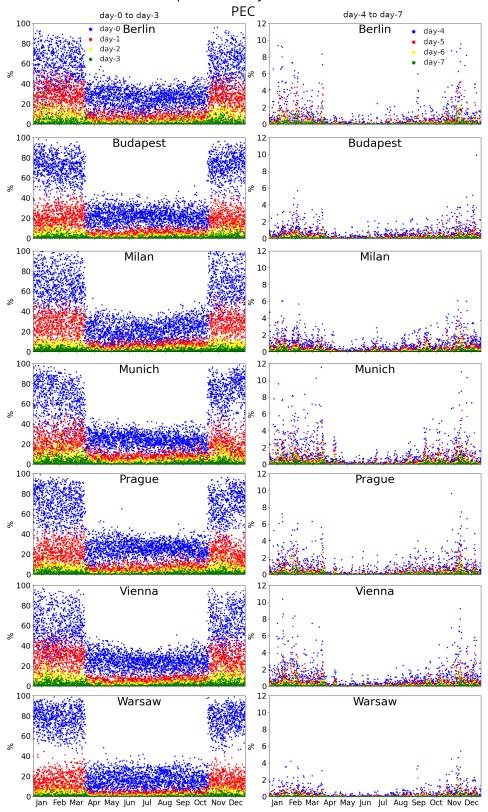


Figure S7: The relative contribution of emissions from day-0, day-1, day-2 and day-3 (left column) and emission from day-4, day-5, day-6 and day-7 (right column) to PEC concentrations for individual days from the 2010-2019 period (grouped by date in the year) for the selected cities. The blue, red, yellow and green color stand for contributions from day-0, day-1, day-2 and day-3, or from day-4, day-5, day-6 and day-7 emissions, respectively.

Boxplots of the relative impacts of past emissions on PM2.5

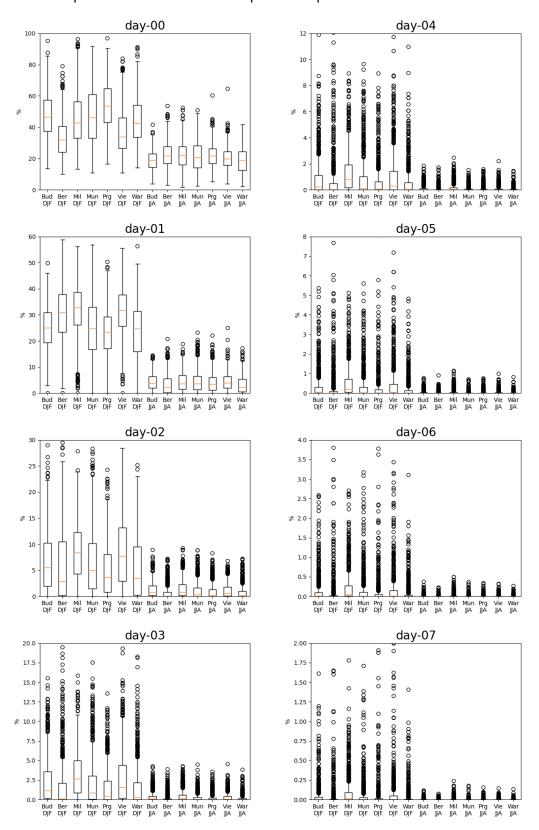


Figure S8: Boxplots of the relative impact of emissions from day-0 to day-7 on 2010-2019 daily PM2.5 concentration for the centres of Budapest (Bud), Berlin (Ber), Milan (Mil), Munich (Mun), Prague (Prg), Vienna (Vie) and Warsaw (War) for DJF (boxplots on the left) and JJA (boxplots on the right).

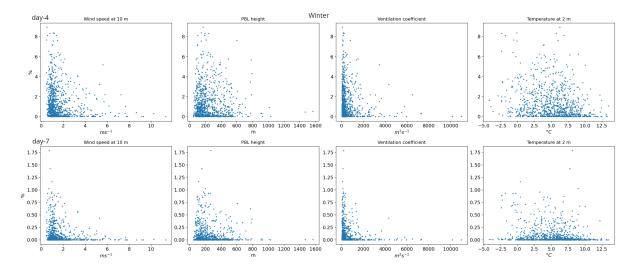


Figure S9: Scatter plots of the relative contributions of emissions from day-4 (upper row) and day-7 (lower row) to the daily mean PM2.5 concentrations vs. the daily mean wind speed at 10 m, planetary boundary layer height, ventilation index and 2m temperature (from left to right) for winter 2010-2019 for Milan.

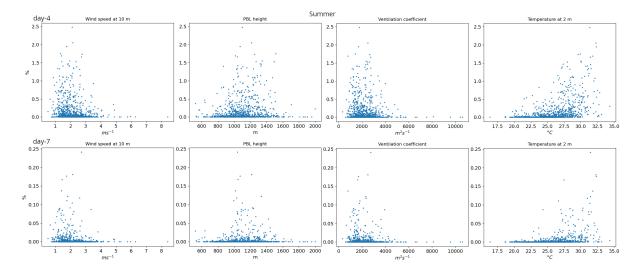


Figure S10: Scatter plots of the relative contributions of emissions from day-4 (upper row) and day-7 (lower row) to the daily mean PM2.5 concentrations vs. the daily mean wind speed at 10 m, planetary boundary layer height, ventilation index and 2m temperature (from left to right) for summer 2010-2019 for Milan.