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Decadal changes in PM pollution in urban cores in the light of emission changes and meteorological variability: a case study for the cities of Graz (Austria) and Prague (Czech Republic)

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Despite ambitious efforts to abate surface air pollution, the thresholds for criteria pollutants are frequently exceeded in the EU-28. PM target levels are most frequently exceeded in industrial regions and urban cores. The recently issued air quality report of the European Environment Agency details that 13 % of the EU-28 urban population was exposed to PM10 levels above the daily limit value and approximately 42 % was exposed to concentrations exceeding the stricter PM10 levels defined by the World Health Organization. Besides local emissions, ambient meteorology and especially stagnation are important regarding PM pollution. Here we assess and compare changes in PM pollution for two central European urban cores (Graz, Prague) following emission reduction measures while simultaneously considering effects of meteorological variability. The observational study is supplemented with analyses of high-resolution chemistry-transport-model (CTM) simulations. Regional climate model (RCM) driven CTM simulations were conducted over central Europe for a selected present-day condition. Furthermore, CTM simulations were performed for the near future (2030s) to assess the impact of different emission levels and modified meteorology on air pollution. The initial reanalysis (ERA-interim) driven RCM/CTM runs were supplemented by global climate model forced RCM/CTM runs, which enabled the inclusion of climate change effects on meteorological conditions.