6b.9 Numerical simulations to assess the effect of urban heat island mitigation strategies on regional air quality

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We present a numerical simulation with WRF-Chem to analyse the effect of Urban Heat Island mitigation strategies on the chemical composition of the urban atmosphere. The urban area of Stuttgart acts as test bed for the modelling of an extreme case scenario of the 2003 European Heat Wave.
The mesoscale chemical transport model WRF-Chem is used to investigate the feedback of temperature reducing urban planning efforts on surface concentration of primary (CO, NO) as well as secondary pollutants (O3). To account for sub-grid scale characteristics of urban areas, a multi-layer urban canopy model is coupled to WRF-Chem and different chemical schemes are adapted to a high resolution land use classification.
Altering the characteristics of the urban surface promote changes in the energy and radiation budgets which modify the accumulation and dilution of primary compounds and the formation of secondary compounds. The simulation results indicate an increase of mean levels of NO and CO by 5-25 % when decreasing the average urban heat island by 1K. The mean ozone concentration in turn is projected to decrease by 5-8 % for the same temperature range while peak values can increase in the bright roof case.