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Mitigation of urban climate and ozone risks

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MiSKOR Minderung Städtischer Klima- und OzonRisiken

MiSKOR is part of the joint funding initiative "Climate change and health" commissioned by the Bavarian State Office for Health and Food Safety (Bayerischen Landesamts für Gesundheit und Lebensmittelsicherheit). Its goal is to attain a better understanding of the relevant biophysical processes and mechanisms to understand the urban heat island and air pollution with the intention of improved urban planning guidelines. We intend to develop a set of recommendations on how to reduce the negative consequences to human health caused by climate change in combination with the urban heat island effect and high tropospheric ozone pollution in small to mid-sized cities in valley locations typical of conditions found in many central European countries. To date, investigations of the urban heat island and air pollution have focused on large metropolitan areas subject to heavy road and air traffic as well as emission from industry. However, we claim and demonstrate from observations that small to mid-sized cities suffer from the same systematic temperature increases and air pollution problems, while offering more opportunities for science-based urban planning via cooperation with local administrations.
We use the city of Bayreuth, a mid-sized town of 70.000 citizens located in Northeast Bavaria, Germany, as a model town to develop the mechanistic understanding as well as the recommendations. Here, we report on the first set of observations over 6 months from a city-wide monitoring network consisting of 12 fully automatic micro weather stations intended to operate continuously for several years recording observations of wind speed and direction from 2-D sonic anemometry, air temperature and humidity, precipitation, shortwave radiation, barometric pressure, number and distance of lightning strikes. The locations for the meteorological and ozone monitoring were selected to specifically maximize across areas with different building height and density, proximity to major road traffic axes, and urban green and water spaces. This comprehensive and detailed dataset combined with digital mapped land-use and urban structure information will be used as input for numerical models to simulate atmospheric and boundary-layer flows (incl. Large Eddy Simulations) in relation to future climate scenarios (RCP4.5/8.5) and possible urban planning actions to mitigate health risks caused by climate change.