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First characterization and comparison of TEB model simulations with in situ measurements regarding radiation balance in a single urban canyon at the BOKU site (Vienna)

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According to the World Health Organization more than half of the world population lives in a city since 2010. Predictions foresee that by 2030 six out of ten people will live in an urban area. As a result, many cities are expanding in size. Almost 10% of all urban dwellers live in megacities (defined according to UN HABITAT as a city with a population of more than 10 million). There are several effects in cities which strongly influence human health. Visible influences like the severe emissions of air pollutants by industry and traffic (e.g. Mayer H., 1999, Grimmond et al., 2010) are obvious to people but thermal stress in urban areas is only recently recognized for its strong devastating effect on human health. As a consequence, the urban environment virtually influences all weather parameters that have an impact on human comfort and thermal stress.
Within this study, we investigate effects of city growth and the development of outlying districts on the local climate of Vienna. We focus particularly on the influence of urban heat island and consequent the risk for heat related illnesses or thermal stress for people. To quantify radiation balance and other important meteorological factors, we performed an extensive field campaign with three types of net radiometer in three different heights at BOKU site in August 2016. The first results indicated a strong correlation (ρ=0.96) between the Town Energy Balance (TEB) model and the measurements of the top net radiometer regarding radiation balance at roof level, meanwhile the TEB results are slightly underestimated. Further check if the measurements are reasonable, a comparison of the input values (global and direct solar radiation) for the TEB simulation with Secondary Standard measurements of ARAD site Wien Hohe Warte shows a deviation under 2% concerning interquartile range on clear sky days. The next steps will enclose TEB simulations, coupled with the mesoscale Weather Research and Forecasting (WRF) model, for whole Vienna including outlying districts and will quantify a possible future urban climate scenario until 2030.

References:

Grimmond C.S.B., et al.: Climate and More Sustainable Cities: Climate Information for Improved Planning and Management of Cities (Producers/Capabilities Perspective). Procedia Environmental Sciences 1, 247-274, 2010.
Mayer H.: Air pollution in cities. Atmospheric Environment, 33, 4029 - 4037, 1999.