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Climatic evaluation of Local Climate Zones in the urban area of Augsburg (Southern Germany) under varying synoptic conditions

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The climate characteristics of urbanized areas differ from those observed in their rural and natural surroundings. Beside climatic differences between urban areas and their surroundings distinct differences also exist within the urban environment. Both effects – urban-rural and intra-urban climatic differences – are due to the spatial distribution of specific features (e.g. natural surfaces, sealed surfaces, buildings) that impact atmospheric processes and thus lead to distinct local scale climate modifications.
A recent approach to objectively categorize urban and rural structures with respect to their specific influences on local climate characteristics is the so called 'local climate zone' (LCZ) concept. The LCZ concept has been applied to determine spatial patterns of climate relevant urban and rural structures for cities and their surroundings worldwide. Thermal characteristics of the LCZ categories have been analysed for different cities and utilising different observational air temperature data sets. However, no studies so far have explicitely investigated in how far thermal characteristics of LCZ types behave under varying synoptic boundary conditions.
Against this background the objectives of the analyses presented in our contribution are:

- the assignment of meteorological measurement sites to LCZ categories derived for the urban area of Augsburg,
- the thermal characterisation of LCZ types utilizing hourly mean air temperature data from suitable stations,
- the investigation of LCZ specific air temperatures considering inter- and intra-zone variations and taking into account temporal (season, time of the day) differences and as well variations related to varying synoptic boundary conditions (i.e. categories of wind speed and cloud cover at a reference station).

Results from our investigations support the climatological relevance of the LCZ concept applied to the urban area of Augsburg. A major finding from our studies is that even for distinctly disturbed synoptic boundary conditions (i.e. elevated wind speed and cloud cover) statistically significant differences in thermal characteristics of LCZ categories are detectable.