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Innovative urban climate model PALM-4U as a support tool for municipal climate adaptation strategies.

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Cities are particularly vulnerable to climate change. At the same time, cities change slowly. Accordingly, preparatory measures to adapt to climate change have to be taken urgently. High-performance urban climate models with various applications can form the basis for prospective planning decisions, however, as of today no such model exists that can be easily applied outside of the scientific community. Therefore, the funding program Urban Climate Under Change $[UC]^2$ aims to further develop the new urban climate model PALM-4U (Parallelized Large-Eddy Simulation Model for Urban Applications) into a practice-oriented and user-friendly product that meets the needs of municipalities and other practical users in addition to scientific research.

Specifically, the high-performance model PALM-4U allows simulation of entire large cities comprising the area over 1.000 km^2 with a grid size of down to few meters. One of our goals within the project ProPolis is to design and test the practical implementation of PALM-4U in standard and innovative application fields which include thermal comfort (indices like PT, PET, UTCI), cold air balance (source areas, reach and others), local wind comfort (indices derived from medium winds and gusts) as well as dispersion of pollutants.

In close cooperation with our practice partners, we explore the potential of PALM-4U to support the urban planning processes in each specific application setting. Additionally, with development of the fit for purpose graphic user interface, manuals and trainings we aim to enable practitioners to apply the model for their individual planning questions and adaptation measures.

In our presentation, we will show an application case of PALM-4U in a major German city. We will investigate the effect of a planned development area on the local climate and the impact of different climate change adaptation measures (such as extensive vs. intensive green roofs). The comparative simulations of the current state and planning scenarios with integrated green and blue infrastructure should provide arguments for the municipal decision making in consideration of climate change aspects in a densely built-up environment, e.g. urban heat stress.