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Demonstration of Land Use Changes Simulation Using Urban Climate Model

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Abstract : Cities in their historical evolution have always adapted their internal structure to the needs of society (for example protective city walls during classicism era lost their defense function, became unnecessary, were demolished and gave space for new features such as roads, museums or parks). Today it is necessary to modify the internal structure of the city in order to minimize the impact of climate changes on the environment of the population. This article discusses the results of the Urban Climate model owned by VITO, which was carried out as part of a project from the European Union's Horizon grant agreement No 730004 Pan-European Urban Climate Services Climate-Fit city. The use of the model was aimed at changes in land use and land cover in cities related to urban heat islands (UHI). The task of the application was to evaluate possible land use change scenarios in connection with city requirements and ideas. Two pilot areas in the Czech Republic were selected. One is Ostrava and the other Hodonín. The paper provides a demonstration of the application of the model for various possible future development scenarios. It contains an assessment of the suitability or inappropriateness of scenarios of future development depending on the temperature increase. Cities that are preparing to reconstruct the public space are interested in eliminating proposals that would lead to an increase in temperature stress as early as in the assignment phase. If they have evaluation on the unsuitability of some type of design, they can limit it into the proposal phases. Therefore, especially in the application of models on Local level - in 1 m spatial resolution, it was necessary to show which type of proposals would create a significant temperature island in its implementation. Such a type of proposal is considered unsuitable. The model shows that the building itself can create a shady place and thus contribute to the reduction of the UHI. If it sensitively approaches the protection of existing greenery, this new construction may not pose a significant problem. More massive interventions leading to the reduction of existing greenery create a new heat island space.

Keywords : climate model, heat islands, Hodonin, land use changes, Ostrava
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