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## **Review of the habilitation thesis of Dr. Michal Žák**

The habilitation thesis of Dr. Michal Žák 'Urban climate in Central Europe' is submitted as a collection of four peer-reviewed publications, three of those in international journals and one in a book, supplemented by a commentary that summarizes the main findings from the publications and draws general conclusions.

The commentary is composed of four main sections, each dealing with a specific aspect of urban climate, corresponding to the four articles that form the main part of the habilitation thesis. The Introduction presents a brief overview on the topic of urban climate and the structure of this thesis. The ways of measuring and documenting the urban heat island (UHI) effect using surface measurements, including its difficulties, is described in Section 1; the UHI from the city of Prague is documented in some details based on measurements from a number of stations in and outside the city center. Approaches to observe the (surface) urban heat island effect with remote sensing techniques are presented in Section 2. Results for the city of Prague, incl. an extensive climatological analysis of MODIS-based data, show the high consistency of the remote sensing and the in situ data. The (dis-)advantages of remote sensing data are briefly discussed.

Section 3 deals with the impact of the UHI effect on thermal comforts and human health; specific measures, e.g., the physiologically equivalent temperature PET, are introduced to better quantify the impact of the urban environment on human health and wellbeing. Within a cooperation with city developers and building planners very small scale model simulations have been conducted and are presented, incl. the impact of shading by newly planted trees within a street canyon. The model simulations presented in Section 4 apply meteorological models to describe and to assess the urban heat effect in selected cities, incl. Prague. The ability of the different approaches to describe the urban impact on the surface and, subsequently, on the local temperature and wind speed is shown and assessed with observations.

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The topic of the habilitation, urban climate, is of high relevance for many disciplines in addition to atmospheric physics, e.g., health, urban planning. The results of scientific analyses within this research field often imply specific actions with wide range and long-term impact on urban infrastructure. Cross-disciplinary research like these require not only a broad expertise in the research activities in the own research field (atmospheric physics in the case of Dr. Žák), but also the willingness and the ability to cooperate with other disciplines, e.g., urban planners, to ensure a successful cooperation.

The involvement of the different scientific disciplines paired with the possible wide range implications of the research results document the wide scientific interest and understanding by M. Žák beyond his own scientific discipline.

With his habilitation, Dr. Michal Žák has proven his comprehensive expertise of urban climate research within atmospheric physics, incl. data analysis of in situ, remote sensing and model-based data records. The high number of peer-reviewed publications (in addition to the four papers that are part of the habilitation) document the high scientific quality of Dr. Michal Žáks scientific work.

The plagiarism audit (Turnitin report) has not shown any serious scientific misconduct regarding copying.

Overall, the thesis fulfills the requirements expected for a habilitation. I, therefore, recommend that it is accepted by the university.



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