

To: Charles University in Prague, Faculty of Mathematics and Physics

This habilitation thesis presents and summarizes the work either directly performed or contributed by Dr. Zak, around urban climate, and in particular urban heat island effect, with a focus over the city of Prague, but also Central Europe. The thesis is structured around four chapters, addressing the features of urban heat island over Prague as deduced from station-based observations, complementary analyses conducted using remote sensing data mainly from the MODIS satellite, impacts of urban heat island on thermal comfort, and finally the modelling of the effects of urban heat islands and how they evolved and will evolve under different future climates.

Dr. Zak has contributed significantly to the understanding of the features of urban heat islands in Prague, as well as the mechanisms of under which conditions they are formed and are more persistent. The impact of urban heat islands on the mean, maximum and minimum temperatures and their seasonality are well-characterized. I would suggest that the DTD temperature variability is better explained, i.e. how it is linked to the urban vs non-urban differences is not clear, and the aims and the importance of the variability in adjacent days is not introduced. I would also suggest showing not only DTD T_{min} in Figure 1.2, but also the maximum and mean.

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In the remote sensing section, it is mentioned that data from MODIS and SEVIRI are used in the work but then results from the MODIS analyses are only presented. I would expect to see results from both analyses, or at least a paragraph on discussing differences or similarities (if any, which I would expect to see some) and the possible reasons. In addition, from Figures 2.2 and 2.3, I was able to see the conclusions presented in the last two bullet points highlighting the highest and lowest intensity of SUHI. This should be better explained unless I am reading the figures wrong. Finally, I could not understand how Figure 2.4 shows the shift of the warmest region. This should also be explained more clearly or the figure should be either be removed or merged with Figure 1 maybe.

In Chapter 3, I found the introduction very long. The work done by Dr. Zac only starts after almost two pages of introduction. I would also give a bit more weight to summarize and discuss the work in Appendix C. It would be very useful to put the findings into context, although partly they are addressed in Chapter 4. I would be very interested to see the impacts on air quality for example (CMAQ modelling), although it may not be the focus of the thesis but helps to put urban heat island effect on a broader context.


Chapter 4 gives a very good overview of the modelling studies targeting urban heat islands. However, as also mentioned above, the chapter would also benefit from a small section on impacts on air quality.

The conclusions very well highlight the main findings of the different studies Dr. Zac lead or contributed to. However, I would expect to see some discussion on the gaps in knowledge and the state-of-the-art tools used in this field and consequently, where the future work should focus according to the experience of Dr. Zac.

Finally, the originality report shows a similarity index of 34%. When the individual scores are analyzed, the similarity index is never more than 2%, and most below 1%. In my opinion, this is expected as this is a summary of the work Dr. Zac has contributed to and published in his career so far, where overlaps in writing will naturally occur.

Overall, I find this habilitation thesis from Dr. Zac very interesting and educative, giving a good overview of his contributions in this field. The only missing part is an outlook and future work, showing Dr. Zac's view on where this field should focus in the future.

Yours sincerely



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