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Interactive comment on "Multi-model comparison of urban heat island modelling approaches" *by* Jan Karlický et al.

Anonymous Referee #3

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In this manuscript, the authors have investigated the role of urbanized surfaces on micrometeorology and air dispersion potential over cities in central Europe. To address this, the paper has used a series of decade long regional simulations with various available urban modules in WRF and RegCM model. This is a well-written paper with clear results and conclusions. This research paper has considerable scientific significance. However, the authors should address the following points, before it is accepted to be published on ACP.

1) Figure 1 : One more panel illustrating the land use land cover mapping at fine ($\sim$1 km or so) resolution will help to compare and understand how well the cities have been represented in the 10 km resolved simulations. Also the location of the cities used in analysis should be marked for ease of readers.

2) Figure 9 and 10: Large uncertainties exist in urban-induced differences in vertical profiles of temperature and wind speed when compared across various configurations. But as also concluded by authors, lack of evaluation limits the ranking of the configurations used. In this regards, evaluation of the vertical profiles of temperature and wind speed against radiosonde observations (over or near these cities) could facilitate improvement in conclusions. Radiosonde observations over the domain of study are available openly from http://weather.uwyo.edu/upperair/sounding.html.

3) Figure 11 and 12: Showing the percentage change in SI and VI due to urban surface will better underline the significant of the urban-induced differences in VI and SI.

4) The conclusion that urban-induced modification enhances pollution dispersion is mainly based on the analysis over Prague. Authors should also check over other big cities in Europe to illustrate robustness of this association.

5) Many short-term urban sensitivity simulations around the globe have shown that urban surfaces enhance convergence of low level horizontal wind over city center (Shepherd et al., 2005; Lin et al., 2008; Sarangi et al., 2018; Niyogi et al., 2017; Zhong et al., 2017). This process can enhance the advection of particulate matter towards city center. Please include analysis/discussion about relative changes in convergence compared to VI and SI for these decade scale runs.

6) Also, the impact of urban surfaces on vertical velocity should be analysed/discussed in context to the urban-induced changes in VI simulated.

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