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On the urban effects in high resolution weather forecast and regional climate simulations

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When downscaling to higher resolution, which is common trend in operational weather forecast, air-quality prediction as well as regional climate modeling, capturing the urban effects properly becomes of primary importance to describe the impact of cities and urban structures on weather, climate and air-quality. This is necessary for proper assessment of not only impacts in the cities, but the effectiveness of adaptation and mitigation options applied within cities. It is valid not only for extreme heat waves impact prediction, but as well in air-quality prediction and in long term perspective in connection to climate change impacts. This provides the background for the project within Operational Program Prague - The Pole of Growth "Urbanization of weather forecast, air-quality and climate scenarios for Prague", shortly URBI PRAGENSI.

In the comparison of different urban parameterizations in WRF and RegCM we demonstrate the importance of urban models in the high resolution simulations, especially under conditions of heat waves. There are differences in the impacts of such parameterizations in different models, but basically all are able to capture the effects of urban heat island in these simulations, which can be quite significant and achieve up to about 8-10 °C difference between the city and its vicinity for large cities during night time, but even in smaller cities like the City of Prague (about 1.5M), it can be more than 5°C. More detailed analysis of the effects in terms of energy balance in the city and remote areas in high resolution simulations will be presented, as well as the impacts on other parameters, especially those connected to air-quality like mixing layer height, stability, etc., where the proper choice of the parameterization really matters and simplistic option like bulk in WRF rather fails.

CORDE FPS on urbanization, which is under preparation, will be introduced with its aims and potential tasks.