EMS Annual Meeting Abstracts
Vol. 16, EMS2019-922-1, 2019

Project URBI PRAGENSI - Urbanization of Weather Forecast, Air-Quality Prediction and Climate Scenarios

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The population living in cities is growing and this is especially true for the largest ones, megacities. However, even smaller cities like the City of Prague (about 1.5 M) can suffer significantly and the night time temperature difference can achieve more than 5°C. To assess the impact of cities and urban structures on weather, climate and air-quality, modelling approach is commonly used and the inclusion of urban parameterization in land-surface interactions is of primary importance to capture the urban effects properly. This is especially important when going to higher resolution, which is common trend in operational weather forecast, air-quality prediction as well as regional climate modeling. This represents the rapidly developing research, motivated by specific risks in urban environment, with strong impacts on vulnerable communities there, leading to the tools to assess properly impacts within the cities and of the effectiveness of adaptation and mitigation options applied there by the city authorities. It is valid not only for extreme heat waves impact prediction, but as well in air-quality forecast and in long term perspective in connection to climate change impacts assessment. This provides the background for the project within Operational Program Prague - The Pole of Growth "Urbanization of weather forecast, air-quality prediction and climate scenarios for Prague", shortly URBI PRAGENSI.

There are four main tasks within the project. First, urbanization of weather forecast, i.e. involving and testing the urban parameterization scheme in the weather prediction model can provide in very high resolution localized weather prediction and especially under the heat wave condition it can well capture the temperature differences in the city center with respect to the remote areas, which can achieved in the midsize city like Prague more than 5°C. There are applications, which can use such localized prediction for planning and decision making on e.g. public services for some specific groups of population in risks. Further, air-quality forecast based on such urbanized weather condition forecast can benefit from better estimates of temperature for chemical reactions, mixing height for dispersion conditions etc. Third, urbanized scenarios of climate change can provide better description of future conditions in the city for adaptation and mitigation options, moreover, in connection to urban heat island urbanized regional climate model in very high resolution is good tool for estimates of efficiency of potential adaptation or mitigation measures which might be applied by the city administration. Last, but not least, microscale simulations using LES methods are supposed to be used for selected local hot-spots to solve them.