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Evaluation of multi-physics urban-scale forecasts in the city of Madrid

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As the share of world population that lives in cities keeps increasing, the effect of urbanized areas in the climate and its representation in atmospheric models has been the subject of increasing interest. At meteorological scale, high resolution is required by different city-level services (e.g. for optimizing their climate control systems). Here we present the evaluation of urban-scale (1.1km) short-range forecasts over the city of Madrid. The simulations, carried out with the WRF model, are compared with hourly records of temperature, wind and relative humidity from a dense network of stations (28 stations in a 80x80 km domain), as well as with a satellite-retrieved land surface temperature product (MODIS). In order to analyze the Urban Heat Island sensitivity to the physical parameterizations, four different model configurations are compared, with 3 boundary layer parameterizations which produce different mixing profiles, and two radiation schemes. The benefits of using a mosaic approach in the Noah land use model are also explored. The study period is one month, which enables to check how the model reproduces the day to day variability of the UHI. These forecasts are part of a project with Madrid's Underground (Metro de Madrid S.A) and cover all its network.