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# Added value of a Kalman Filter in urban-scale forecasts in the city of Madrid

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Limited area models are currently able to simulate the urban climate, especially the urban heat island, with a reasonable accuracy. However, in many cities there exist biases in the simulated magnitude of this phenomena. These may be related to missing or incomplete information about the parameters characterizing buildings and streets, limitations on the simulation of the coupling between the urban-canopy and the PBL or other model deficiencies. Here we show that these biases, together with other structural biases of the model, can be reduced by post-processing the forecasts with a Kalman Filter. In order to do this, short range 1 km forecasts over the city of Madrid are analysed, for both the warm and the cold season. These forecasts are evaluated with a dense network of 28 stations. The Kalman Filter is configured to use the previous 6 days of data to update the covariances and to compute the correction to apply to each new forecast. In order to account for the daily cycle of the bias, a different filter is used for each hour of the day. Also, several methods are explored to account for weather changes, which can produce sudden shifts in the bias and thus incorrect corrections. Instead of using the nearest neighbors, the most representative nearest gridpoints are used, which are selected using a high resolution land use dataset. Finally, the interpolation of the correction to other, not observed points, is explored, by using an interpolation scheme which takes into account the urban-rural boundary. These forecasts are part of a project with Madrid's Underground (Metro de Madrid S.A.) and cover all its network.