



Improving weather forecasts by assimilation of crowdsourced meteorological data in NWP models

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Crowdsourcing and citizen science contributions have become more and more a valuable approach in the atmospheric sciences. Hobby meteorologists put forward their collected data on platforms as www.netatmo.com, www.weathersignal.com, www.wunderground.com, and wow.metoffice.gov.org. Moreover smartphones provide pressure observations, air temperature, humidity directly from sensors, but can also be estimated from smartphone battery temperatures. In addition, many weather observations are being collected from a variety of transport modes. This development helps to understand the weather in data-scarce regions. So far, crowdsourced data have mainly been used for academic research by evaluating them against routine observations, and for numerical model validation. In this study we explore the added value of crowdsourced observations in numerical weather prediction via data-assimilation into initial fields of the Weather Research and Forecasting model. The highest relevance is expected for weather phenomena are characterised by small-scale processes, since the crowdsourced data are excellent for filling gaps in route measurement networks. In this study we will apply data assimilation of private weather station data for forecasting the urban heat island (UHI) effect of Amsterdam at 100 m grid spacing. Thereto we present a new method for assimilating air temperatures into an urban canopy scheme. It is shown that the additional data assimilation improves the UHI prediction. Moreover, we will show that data assimilation of private weather stations observations substantially improves the forecast for a squall line that inundated a large part of Amsterdam on July 28th 2014. With data assimilation, both intensity and location are substantially improved.