
Assimilation of surface observations from citizen weather stations into a regional weather prediction system

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Abstract

The new unprecedented massive amount of near-surface meteorological measurements from crowd sourced observation networks offers various new possibilities for improved weather forecast on regional and local scale, as well as for the development of real time weather products. That is why in the German Meteorological Service (DWD) we study the impact of assimilating observations from the private weather station's network NETATMO, within the regional weather model ICON-LAM. A comparative study takes place, where temperature and humidity observations from NETATMO over Germany are assimilated in addition to their synoptic analogues and a full set of available measurements, such as 2m temperature, surface pressure, 10m winds, observations from airplanes, wind profilers and radiosondes. As the crowd-sourced measurements suffer from strong biases and high noise, a bias correction approach is applied, based on the diurnal cycle of temperature and humidity variables. The preliminary results show that the assimilation of NETATMO observations profits always from the bias corrections and it can keep up with the positive effect of assimilating temperature and humidity synoptic observations. The model's cold bias in the lower atmosphere can be reduced by the assimilation of NETATMO surface temperature observations, while the corresponding humidity observations give a neutral error reduction.

Keywords: crowd sourced observations, citizen weather network, private weather stations, data assimilation, regional model, ICON LAM, NETATMO, bias correction, surface data

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