
Exploring the characteristics of a vehicle-based temperature dataset for convection-permitting numerical weather prediction

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Abstract

Crowdsourced vehicle-based observations have the potential to improve forecast skill in convection-permitting numerical weather prediction (NWP). Our aim is to explore the characteristics of vehicle-based observations of air temperature. We describe a novel low precision vehicle-based observation dataset obtained from a Met Office (UK) proof-of-concept trial. In this trial, observations of air temperature were obtained from built-in vehicle air-temperature sensors, broadcast to an application on the participant’s smartphone and uploaded, with relevant metadata, to the Met Office servers. We discuss the instrument and representation uncertainties associated with vehicle-based observations and present a new quality-control procedure. It is shown that, for some observations, location metadata may be inaccurate due to unsuitable smartphone application settings. The characteristics of the data that passed quality-control are examined through comparison with km-scale NWP data and nearby independent observations of air temperature. Our results show that the uncertainty associated with vehicle-based observation minus-model comparisons is likely to be weather-dependent and possibly vehicle-dependent. Despite the low precision of the data, vehicle-based observations of air temperature could be a useful source of spatially-dense and temporally-frequent observations for NWP.

Keywords: crowdsourced data, convection, permitting NWP, vehicle, based observations, observation uncertainty, quality control

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