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High-Resolution Ensemble Modelling of Fog Over the UK

A. Porson (2), H. Lean (2), A. Lock (1), J. Price (3), N. Roberts (2), and W. Tennant (1)
(1) UK Met Office, Exeter, (2) UK Met Office, Reading, (3) UK Met Office research field site, Cardington

Fog modelling remains a challenge for weather forecasting. High resolution is needed to capture the details of the land-use on the surface energy balance and advection processes, and the fine processes happening in the lifecycle of the fog depend on the accuracy of a lot of physical parameterizations, such as the cooling rate of the stable boundary-layer, the land-surface paramaterization, the link between aerosols and microphysics, the radiative properties of the atmosphere or also the paramaterization of the entrainment across the top of the boundary-layer when the fog grows into a well-mixed layer.
Here, we investigate the predictability of fog by using a high-resolution ensemble model, from 2.2 km down to 100 m resolution. The high-resolution ensemble model from the UK Met Office (MOGREPS-UK) runs routinely at 2.2 km. This model has shown a lot of variability on a selection of severe fog cases over the past winter. We examine whether this variability changes from 2.2 km to 100 m resolution. We also assess the guidance provided by the ensemble as a whole, in comparison to the observations from the UK synoptic stations and satellite imagery, and against the observations from the UK Met Office research field site at Cardington. A companion paper presents results from the observations of fog development and dispersal carried out at Cardington.