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Observation, modelling and forecasting of radiation fogs

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The main focus of this study is to provide a forecast application for radiation fogs for its implementation into the meteorological facility of the new aerodrome of Rozas (Spain). Ten events were registered and studied by means of a microwave radiometer (MP-3000A), a present weather sensor (VPF-730), a ceilometer, and a micro rain radar (MRR-2). Successively, the WRF model was applied for analyzing the atmospheric fields related to the formation and dissipation of radiation fogs in the study area both on a synoptic scale and on a mesoscale, and the prognosis capacity of the model for short-term prediction. Subsequently, a sensitivity analysis was developed for 18 combinations of microphysics, radiation, planetary boundary layer and surface layer parameterizations of the WRF model.

For the validation of the model and the calculation of the optimal thresholds of the observed variable (height of the cloud base) and the predicted variable (liquid water content), five indicators or skill scores and a penalty score were used. Two forecasting options were developed. One consists in a deterministic forecast by using the best combination of parameterizations, generating a binary forecast scenario (no fog / fog itself). The second involves a probabilistic model by means of an ensemble of parameterization combinations that obtained better indicators, developing a tool that provides a probabilistic forecast of fog risk (%).

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