Intercomparision of single-column numerical models for the prediction of radiation fog

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The short-term forecasting of fog is a difficult issue which can have a large societal impact. Radiation fog appears in the surface boundary layer and is governed by the interactions between the surface and lower layers of the atmosphere.

Current NWP models poorly forecast the life cycle of fog, and advanced NWP models are needed before improving the prediction of fog. Six numerical model simulations are compared for two cases from the Paris-CdG fog field experiment. This intercomparison includes both operational and research models, which have ignificantly different vertical resolutions and physical parameterizations.

The main goal of this intercomparison is to identify the capabilities of the various models to accurately forecast fog. An attempt is made to identify the main reasons behind the differences between the various models.

This intercomparison reveals that significant differences between models exist in the surface boundary layer before the fog onset, particularly in case of light wind. The lower resolution models crudely forecast the nocturnal inversion, the strong gradient at the top of the fog layer and the flux at the ground.

This intercomparison illustrates the important roles of dew deposition and gravitational settling on the prediction of fog.