

Assimilation of wind from AMDAR into the one dimensional fog forecasting model COBEL

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As poor visibility conditions have a considerable influence on airport traffic, a need exists for accurate and updated fog and low cloud forecasts. COBEL-ISBA, a boundary layer 1D numerical model, has been developed for the very short term forecast of fog and low clouds. This forecast system assimilates (using 1D-Var method) the information from a local observation system designed to provide details on the state of the surface boundary layer, as well as that of the fog and low-cloud layers, to produce initial profiles of temperature and specific humidity. The initial conditions have a great impact on the skill of the forecast. The impact of assimilation of high temporal resolution of wind observation from aircraft measurements, on short-range numerical weather forecasting (up to 12 hours) using the one dimensional fog forecasting model COBEL is studied in the present work. The wind observations are extracted at Nouasseur airport, Casablanca, Morocco, over a winter period from the national meteorological database. It is the first time that wind profiles (up to 1300 m) are assimilated in the framework of single column model. When assimilated into COBEL with an hourly update cycle, the wind field is better for now-casting purposes. The assimilation system estimates the flow-dependent background covariances for each run of the model and takes the cross-correlations between temperature, humidity and wind into account. It is found a positive impact of wind assimilation in the first hours of the forecast and then its impact gradually turns into a neutral impact. Thus, assimilation of high resolution wind observations from AMDAR is beneficial for now-casting and short-range fog forecasts up to three hours.