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Thermal Mapping Data in Verification of Road Weather Modelling

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Due to increased resolution in the numerical weather prediction models, assimilation of satellite cloud related data on an hourly basis, and integration of measurements of road conditions from road maintenance vehicles allowed to improve quality and accuracy of road weather forecasting. The DMI Road Weather Modelling (RWM) system uses these changes for operational forecasting of road conditions at more than 380 road stations of the Danish road network. Recently the focus has shifted to forecasting along the roads' stretches at short distances of 2 km or less.

In this study, the vehicles measurements of the road conditions (road surface and air temperatures - thermal mapping data) from the Ribe and Viborg Communes roads – VA-4, RI-1, and GR-2 - of the Jylland Peninsula (Denmark) have been used for verification of performance of the Danish RWM system. During 2005-2007, in total more than 250 cases/dates with road salting activities have been identified and analyzed by comparing observed and forecasted road surface and air temperatures at 112 selected stretches (situated at distances of 2 km from each other) of the road.

The output of road conditions forecasting for all cases is evaluated. The main focus is on the night time forecasts, although the diurnal variability was also evaluated. The possibilities of thermal mapping data assimilation into RWM system and intercomparison with forecasted temperature values for several specific cases are discussed.

It is found that the RWM system has a good predictive skill for the road surface temperature at the road stretches having a mean absolute error of 0.5-1ºC (bias - less than $\pm$0.5ºC) for all stretches during November-March. For the air temperature, the mean

absolute error is within 1ºC and higher (bias - always positive and higher than 0.5ºC). On a diurnal cycle, for the road surface temperature the nighttimes had the best quality of prediction and the score is the lowest during 12-14 h of local time, and vise versa for the air temperature. Only in 10 and 18% of the road activities for the road surface and air temperatures, respectively, the mean absolute error is higher than $|\pm 1.5$ºC$|$.