Geophysical Research Abstracts
Vol. 15, EGU2013-5091-2, 2013
EGU General Assembly 2013


# Road surface temperature forecast through multivariate data analysis

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Road surface temperature forecast is a key component of winter maintenance strategy in many western countries. Numerous tools exist to aid road managers in organizing services and consequently triggering de-icing operations. Forecasting strategies have been common place since the 1980s, of which thermal mapping has been long established component to get the spatial variation of road temperature along roads. The technique uses IR thermometry to measure road pavement temperature and an atmospheric probe for air temperature, both at a high resolution interval, to identify sections of the road network prone to ice occurrence. However, measurements are time-consuming and ultimately only provide a snapshot of a network at the time of the survey. As such, surveys have to be conducted under a series of specific climatic conditions during winter but it is questionable whether the range of atmospheric conditions is representative enough of winter. This work investigates the role of multivariate data analysis to thermal mapping data. Principal Components Analysis and Partial Least-square regression were used to interpolate between individual thermal mapping surveys to build a thermal map and road surface temperature forecast, for a wider range of climatic conditions. The results indicate that when this approach needed fewer thermal mapping surveys. Furthermore, comparisons with numerical models indicate the combination of multivariate data analysis and of thermal mapping as an appropriate verification method for the road surface temperature forecasts.