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Network pavement surface temperature forecast through remote sensing and chemometric data analysis

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Winter maintenance is facing one major challenge, consisting in obtaining a forecast of pavement temperature at a full road network scale. Although solutions based of numerical physical models do exist, they are all based on a 1D-description of the road structure, along with a schematic representation of its structure applied to a whole network. Recently, some research indicated the benefits of combining thermal mapping (infrared temperature of pavement surface, air temperature, relative humidity ans some other road weather variables measurements) and chemometric methods (principal components analysis (PCA) and partial least-square regression (PLS)) to reach a forecast of a road stretch on the basis of air temperature at a given spot of this road stretch. This approach was based on a parameter k arbitrarily selected to extract the most appropriate road surface road stretch profile from PCA and PLS results. Last developments were dedicated to the implementation of an automatic and mathematically supported method to identify the most relevant stretch taking into account the forecast weather conditions and the weather conditions of the thermal mapping measurements. It also proposes an other way for the determination of the parameter k, along with an application to provide road manager a real-time of the risk of ice occurrence at full network, the network being either a road one, an airport or a tramway one.