Geophysical Research Abstracts
Vol. 17, EGU2015-11940, 2015
EGU General Assembly 2015

Urban pavement surface temperature. Comparison of numerical and statistical approach

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The forecast of pavement surface temperature is very specific in the context of urban winter maintenance. to manage snow plowing and salting of roads. Such forecast mainly relies on numerical models based on a description of the energy balance between the atmosphere, the buildings and the pavement, with a canyon configuration. Nevertheless, there is a specific need in the physical description and the numerical implementation of the traffic in the energy flux balance. This traffic was originally considered as a constant. Many changes were performed in a numerical model to describe as accurately as possible the traffic effects on this urban energy balance, such as tires friction, pavement-air exchange coefficient, and infrared flux neat balance. Some experiments based on infrared thermography and radiometry were then conducted to quantify the effect fo traffic on urban pavement surface. Based on meteorological data, corresponding pavement temperature forecast were calculated and were compared with fiels measurements. Results indicated a good agreement between the forecast from the numerical model based on this energy balance approach. A complementary forecast approach based on principal component analysis (PCA) and partial least-square regression (PLS) was also developed, with data from thermal mapping usng infrared radiometry. The forecast of pavement surface temperature with air temperature was obtained in the specific case of urban configurtation, and considering traffic into measurements used for the statistical analysis. A comparison between results from the numerical model based on energy balance, and PCA/PLS was then conducted, indicating the advantages and limits of each approach.