



Estimation of Urban Sensible Heat Flux Using a Dense Wireless Network of Observations

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Over complex urban terrain, the determination of the sensible heat flux is a challenging task due to an irregular surface geometry and variabilities in surface types, each having different thermal properties. To address this, in 2006-07, a major field campaign (LUCÉ) took place at the École Polytechnique Fédérale de Lausanne campus, a moderately densely occupied urban site. A distributed network of 92 wireless weather stations was combined with routine atmospheric profiling, offering high temporal and spatial resolution meteorological measurements.

The objective of this study is to estimate the sensible heat flux between the ground and the atmospheric surface layer for convective conditions. Calculations were based on Monin-Obukhov similarity for temperature in the surface layer.

The results illustrate a good agreement between the sensible heat flux inferred from the thermal roughness length approach and independent calibrated measurements from a scintillometer located inside the urban canopy. It was also found that using only one well-selected station can provide an excellent estimate of the sensible heat flux over the campus for convective conditions.

Overall, this study illustrates how an extensive network of meteorological measurements can be a useful means to estimate the sensible heat flux in complex urban environments.