

Mobile Meteorological Measurements during the 2015 Toronto Games

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Characterized by large spatial heterogeneity in surface characteristics, urban areas exhibit large differences in microclimate conditions. Consequently, meteorological variability at this scale has become an important issue surrounding human health and thermal comfort within cities. However, the representative monitoring of urban microclimate conditions is not regularly undertaken by meteorological agencies.

To overcome this, we used an alternative and complementary approach of conducting mobile measurements using vehicle-mounted sensors. This methodology allowed us to sample a variety of neighbourhoods within Toronto, including a rural reference, with contrasting surface characteristics, classified through the use of the Local Climate Zone scheme [1].

Our analysis will answer the following research questions based on measured air temperature, surface temperature, and humidity and a calculated human thermal comfort index, the Wet-Bulb Globe Temperature: 1) What differences exist between inter-urban neighbourhoods? and 2) What is the urban to rural contrast under hot, calm, clear nights?

Mobile measurements were also made, often simultaneously, by three vehicle-mounted Automated Mobile Meteorological Observation System (AMMOS) units over the course of the 2015 Toronto Games period. The primary objectives were to collect meteorological data for characterizing lake-breeze fronts and thunderstorm gust fronts, and validating urban-scale NWP model output along ‘urban street canyons’ where fixed surface stations are difficult to install.

The AMMOS observations complement those made using the Toronto Games Mesonet for which over 50 new fixed surface stations were installed. Preliminary analyses of the AMMOS / Mesonet data will be discussed.

References: [1] I. D. Stewart and T. R. Oke. (2012). “Local climate zones for urban temperature studies,” *Bull. Am. Meteorol. Soc.*, vol. 93, no. 12, pp. 1879–1900.