



Using smartphone batteries as an urban thermometer

Arjan Droste (1), Jan-Jaap Pape (2), Aart Overeem (3,4), Hidde Leijnse (3), Gert-Jan Steeneveld (1), Aarnout Van Delden (2), and Remko Uijlenhoet (4)

(1) Meteorology & Air Quality section, Wageningen University & Research, Wageningen, Netherlands, (2) Institute for Marine and Atmospheric Research (IMAU), Utrecht University, Utrecht, the Netherlands, (3) Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands, (4) Hydrology & Quantitative Water Management group, Wageningen University & Research, Wageningen, the Netherlands

Taking meteorological measurements in the urban environment is notoriously difficult due to the complex geometry at street and neighbourhood level. Traditional weather stations are absent in cities because of WMO regulations, so urban data has to come from typically expensive measurement-networks, or short intensive campaigns. While traditional measurements are scarce, there is an abundance of smart devices in cities: the well-known Internet of Things. It is for these reasons that crowdsourcing data has an enormous potential in cities, to deliver vast quantities of data without the maintenance costs of a measurement network. A promising source of potentially valuable data is the smartphone, because of its ubiquity and the many sensors most newer phone models now possess. Since most people nowadays have a smartphone, and carry it around wherever they go, data logged by the phone can be used to estimate the urban air temperature. A persistent log taken by nearly all smartphone models, even those without air temperature sensors, is the smartphone's battery temperature. The free OpenSignal smartphone application logs this battery temperature (among many other variables) and the position of the smartphone, which makes it possible to estimate the urban air temperature through a straightforward heat transfer model relating battery temperature to air and body temperature. The obtained urban temperatures are accurate within 1 to 2 degrees of certified measurement stations, proving the huge potential of this innovative method.

This poster focuses on describing how thousands of daily smartphone battery temperature measurements can be translated to a relatively robust estimation of an urban air temperature, using 2 years of data from São Paulo in Brazil. Analysis of the results is presented in a separate session.