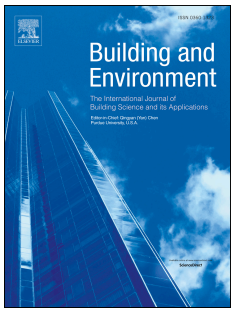
Accepted Manuscript



Surface heat assessment for developed environments: Optimizing urban temperature monitoring

Carl Malings, Matteo Pozzi, Kelly Klima, Mario Bergés, Elie Bou-Zeid, Prathap Ramamurthy

PII: S0360-1323(18)30325-1

DOI: 10.1016/j.buildenv.2018.05.059

Reference: BAE 5497

To appear in: *Building and Environment*

Received Date: 7 April 2018

Revised Date: 24 May 2018

Accepted Date: 28 May 2018

Please cite this article as: Malings C, Pozzi M, Klima K, Bergés M, Bou-Zeid E, Ramamurthy P, Surface heat assessment for developed environments: Optimizing urban temperature monitoring, *Building and Environment* (2018), doi: 10.1016/j.buildenv.2018.05.059.

Surface Heat Assessment for Developed Environments: Optimizing Urban Temperature Monitoring

Carl Malings[1], Matteo Pozzi[2], Kelly Klima[3], Mario Bergés[4], Elie Bou-Zeid[5], and Prathap Ramamurthy[6]

Abstract

The urban heat island effect, exacerbated by rising average surface temperatures due to climate change, can lead to adverse impacts on city populations. Fine resolution modeling of the spatial and temporal distribution of extreme heat risk within a city can improve the strategies used to mitigate this risk, such as the issuance of targeted heat advisories to city residents. In this paper, we combine a recently developed method for probabilistic modeling of urban temperatures with previously developed vulnerability assessments, and then implement sensor placement optimization techniques to guide temperature monitoring in urban areas. A variety of metrics are used to optimize the placement of temperature measures to best support decision-making for monitoring and responding to extreme heat risk. This optimal sensor

[1]Civil and Environmental Engineering Department, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213 USA (Corresponding Author; e-mail: cmalings@andrew.cmu.edu).

[2]Civil and Environmental Engineering Department, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213 USA.

[3]RAND Corporation, 1776 Main Street, Santa Monica, CA 90401 USA.

[4]Civil and Environmental Engineering Department, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213 USA.

[5]Department of Civil and Environmental Engineering, Princeton University, 59 Olden Street, Princeton, NJ 08544 USA.

[6]Department of Mechanical Engineering, City College of New York, 160 Convent Avenue, New York, NY 10031 USA.