[Wed B1.2]

Urban Form and Microclimate: A Rapid Assessment Method for Pedestrian Thermal Comfort

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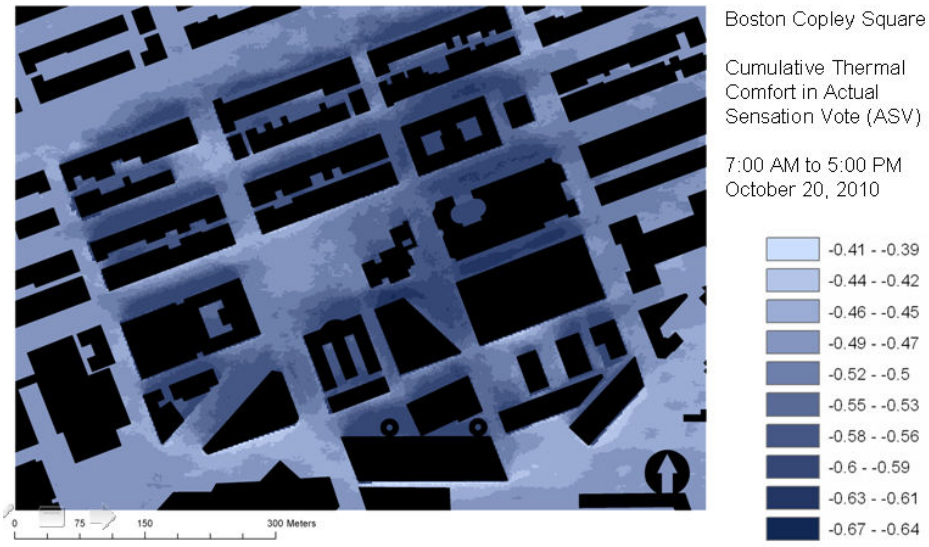
Urban residents experience a highly transient climate. Within this context, natural conditions are altered by the artificial landscape of buildings and infrastructure. The effect of urban form on microclimate is relevant to human comfort and temperature stress, a critical issue often overlooked. As the trend towards urbanization continues, policy makers and planners will need to address microclimate in the design of environments that simultaneously promotes human health and sustainability.

This paper focuses on outdoor thermal comfort at pedestrian scale. The core of this research is a rapid assessment method for urban microclimate (RAMUM). The workflow takes in digital 3D models and weather data, and it will be able to return hourly thermal comfort conditions for streets and open spaces. Using a Boston site as a case study, the research analyzes outdoor thermal comfort condition, adopting metrics from existing literature including Thermal Sensation (TS), Predicted Mean Vote (PMV), Standard Effective Temperature (SET), and Physiologically Equivalent Temperature (PET). These metrics will be compared with each other as well as field measurement. Also, the study will discuss the effect of urban form on pedestrian thermal comfort. Suggestions will be made on urban governance, planning, and design practices in the age of climate change. This research is supported by the NFS Award ‘Creating Opportunities for Adaptation Based on PULSE’.



Keywords: Pedestrian Thermal Comfort, Urban Microclimate