Heating Monitoring In New York Subway System

CUNY-MTA

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Abstract

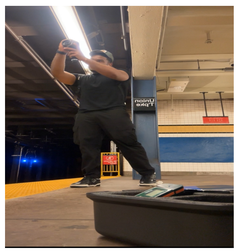
New York City faces great challenges due to the rapidly changing climate. Many facilities including underground transportation infrastructure will be impacted severely from climate change effects, particularly the increasing heat waves. The variability of temperature in the subways of New York during heat ways period could impact the health and safety not only of commuters but also the subway system personals. However, the severity of such temperature change is not well known. For this reason, in this study, we conduct a thorough investigation of how temperatures change within the subway system.

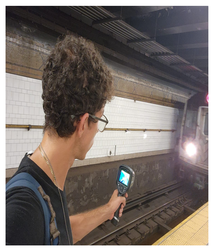
Methods & Methodology

Temperature and relative humidity data were collected using sensors and thermal infrared cameras in several underground stations located in the Bronx, Brooklyn, Manhattan and Queens. Our findings will highlight critical areas where temperature management is most needed, suggesting targeted interventions to mitigate heat buildup.

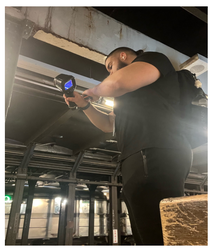






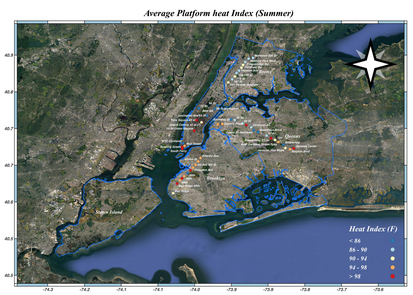


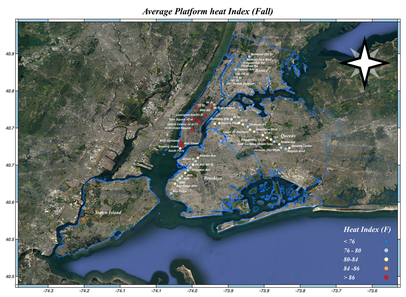


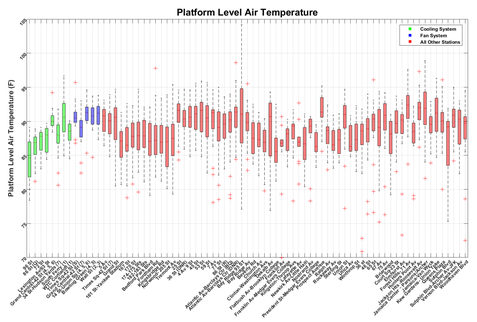


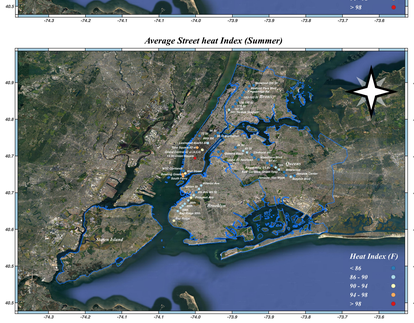
Results

Our results indicate that the temperature and humidity levels on the platform are significantly higher than those on the surface. We observed that the Bronx has the lowest temperature but the highest humidity. Conversely, Queens and Brooklyn have the hottest subway platforms. Manhattan exhibits a combination of high heat and humidity, despite the presence of air conditioning systems. During the data collection process, we observed the uncomfortable conditions in the subways, particularly on days when temperatures exceeded 90 degrees. Infrared images provided intriguing data, revealing how structural elements such as beams transmit heat to the platform and how the presence of trains affects both temperature and humidity levels.

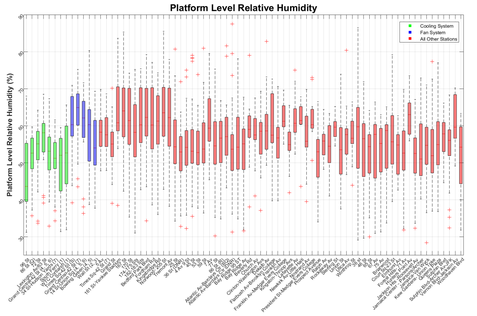


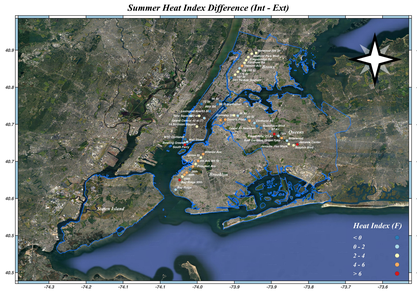


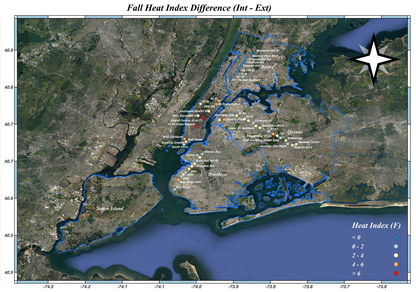


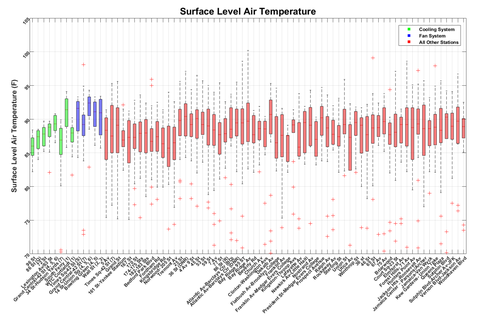


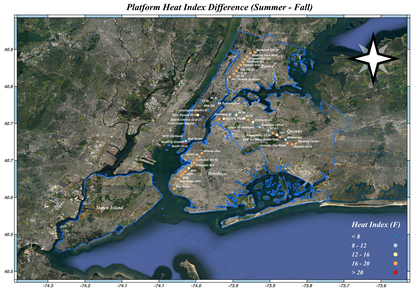




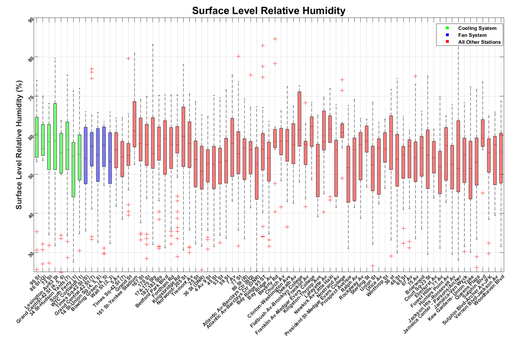


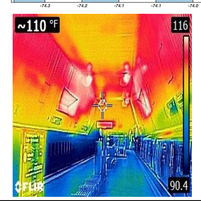


















Conclusion

The general Heat Index(HI) for Fall averaged **80.18 F**, with stations equipped with AC or fans recording a lower average of **79.39 F**, While other stations averaged **80.20 F**. On the other hand, the general HI for the summer rose **93.11 F**, with AC stations averaging 87.1 F while other stations averaged **95.11 F**. This indicates that cooling systems modestly reduce the temperatures on the trains and also highlights significant seasonal variations.

Acknowledgment

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