What Makes NYC Hotter

- An Data Visualization Project about Urban Heat Island in NYC

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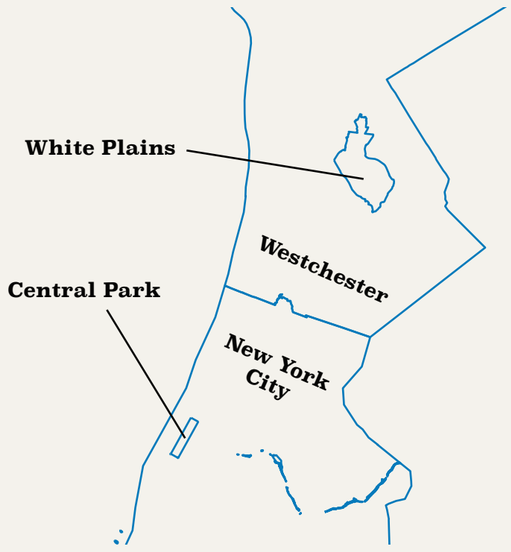
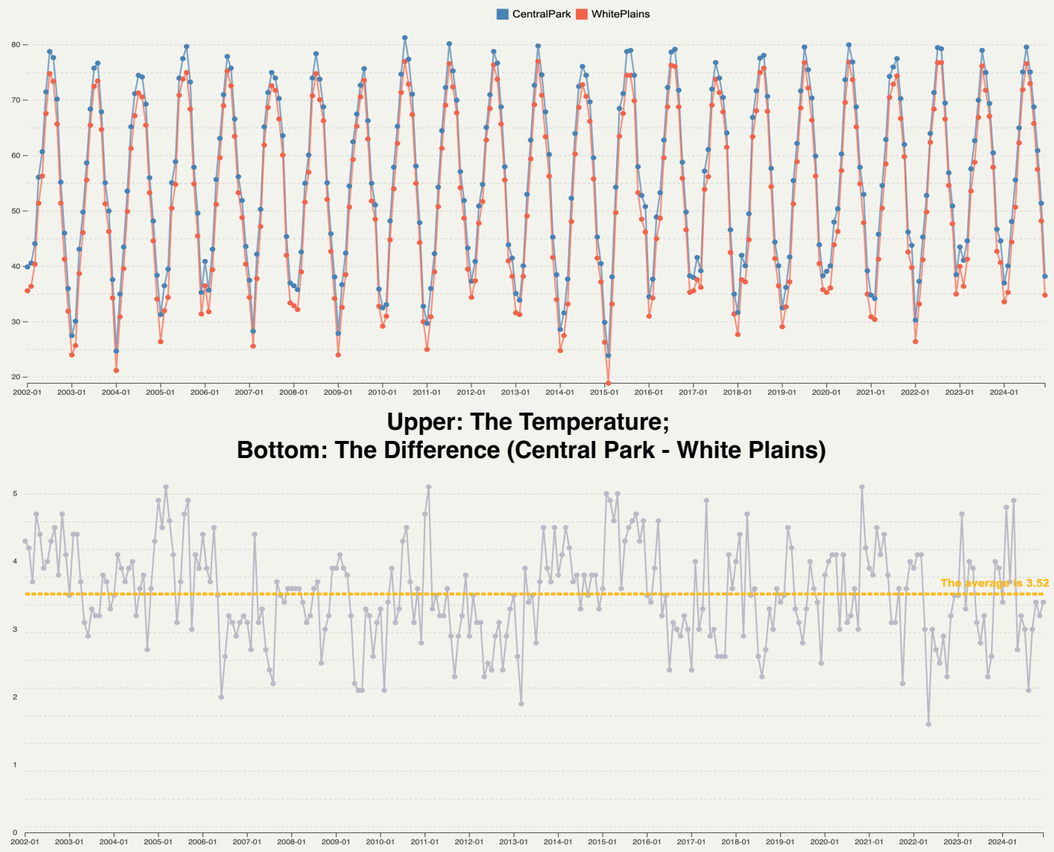
PROJECT WEBSITE: HTTPS://KHARLEWU.NET/UHI_NYC/

- So Close, But So Different



White Plains is just 25 miles away from Central Park, but the temperature is so different.

According to the data from **National Weather Service**, Since 2002, the temperature in Central Park is always higher than White Plains with an average temperature of 3.52F.



Upper: The Temperature;
Bottom: The Difference (Central Park - White Plains)

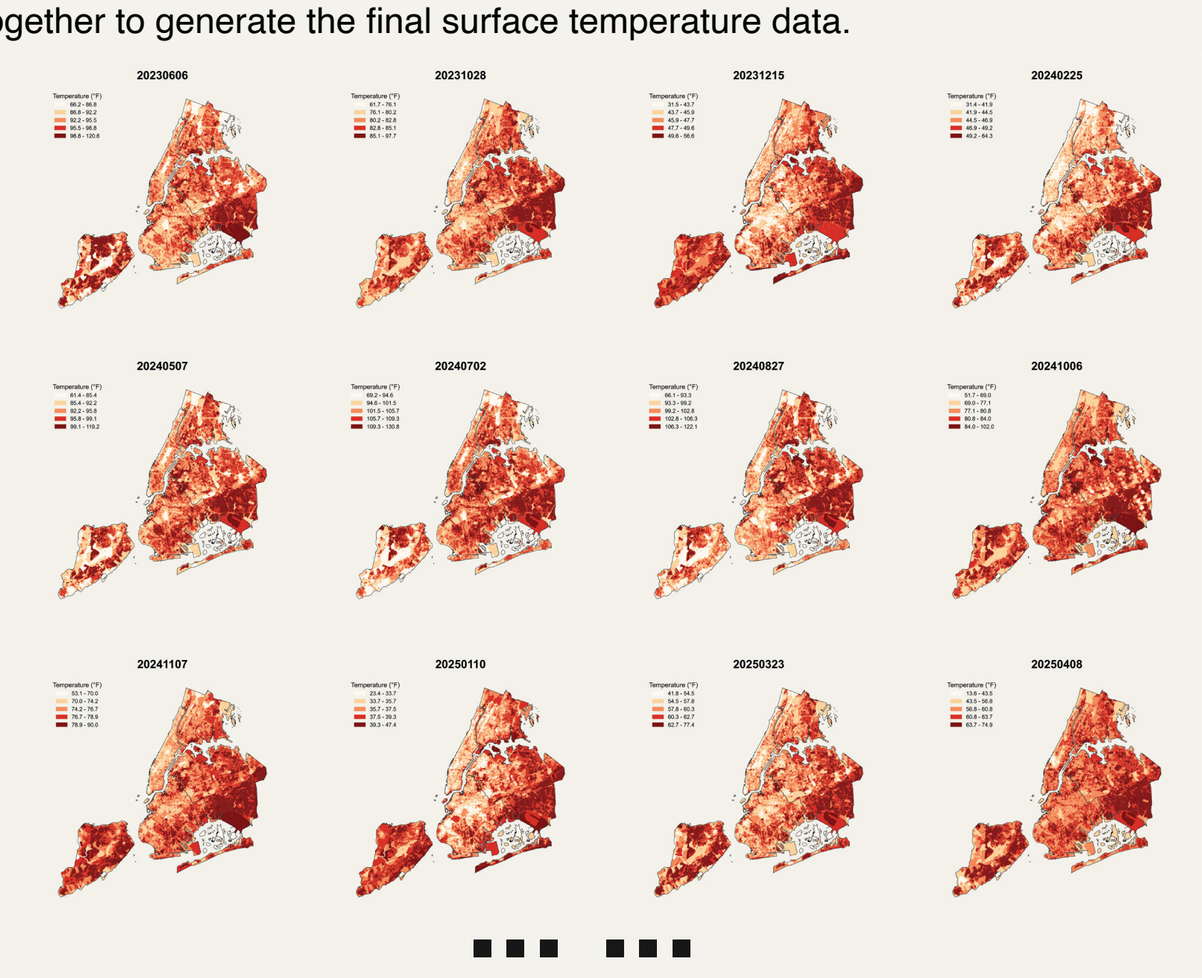
What might cause this difference?

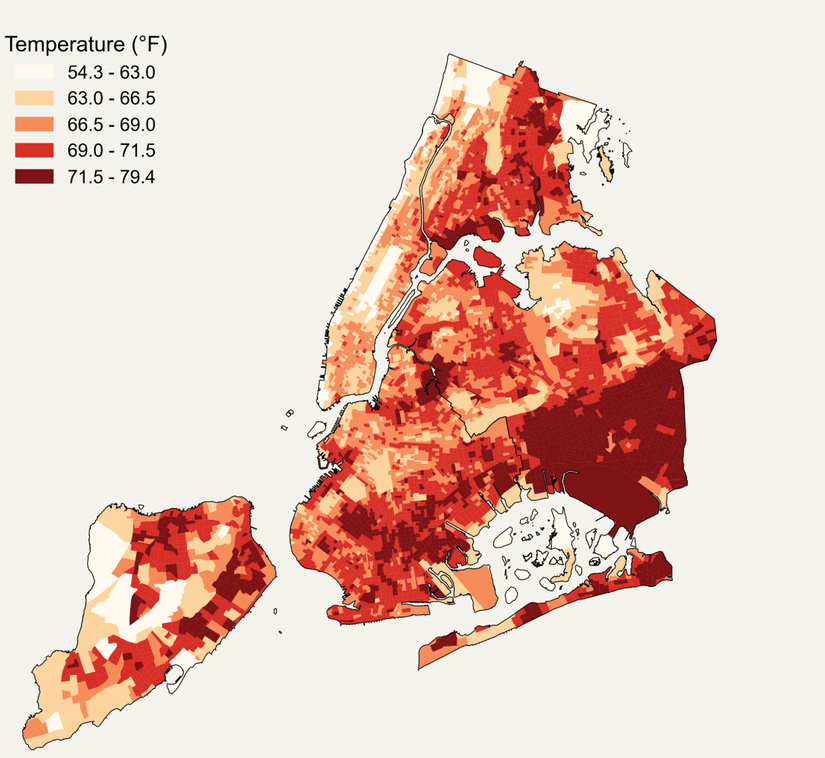
It might because of the Urban Heat Island Effect.

Urban Heat Islands are urbanized areas that experience higher temperatures than outlying areas. Structures such as buildings, roads, and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies.

- The Urban Heat Island in NYC

To evaluate the urban heat island effect in New York City, this project utilized surface temperature data provided by the **U.S. Geological Survey (USGS)**. Beginning in October 2022, a total of **60** raster datasets were selected, each capturing the NYC area **without significant cloud cover**. These cloud-free scenes were chosen to ensure data quality and consistency for analyzing surface temperature patterns across the city. Here are the results of 12 Date, The data is in **census block group** level, and the date format is in **YYYYMMDD**. After conducting the analysis for every date, the project layers them together to generate the final surface temperature data.

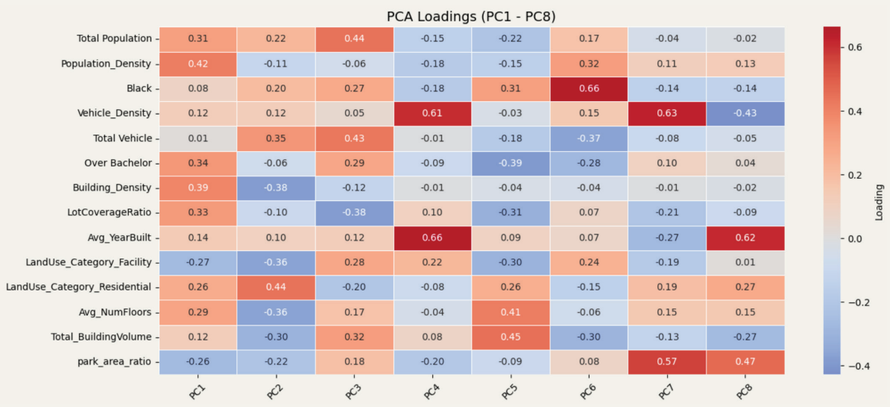




THE FINAL SURFACE TEMPERATURE DATAUSED FOR FUTURE ANALYSIS

- What is Contributing to Urban Heat Island Effect

The project gathered **24 types of data** from sources including the U.S. Census Bureau, NYC Department of City Planning, and NYC Open Data. To reduce dimensionality and uncover underlying patterns, the dataset was first filtered by selecting **14 variables** with an **absolute Pearson correlation greater than 0.1** with surface temperature. Principal Component Analysis (PCA) was then applied to extract the most significant features. These components were subsequently analyzed alongside surface temperature data using Geographically Weighted Regression (GWR), enabling the identification of key spatial factors influencing the Urban Heat Island effect in New York City.



PCA Component Loadings
(Showing how each variable contributes to each principal component)

PC_Name	Mean | Coefficient
PC4	9.29
PC7	8.09
PC8	6.13
PC2	2.2
PC6	2.15
PC1	1.91
PC3	1.17
PC5	1.11

GWR Variables Importance
(Showing the importance of every Principle Component to the Model)

The results shows that PC4, PC7, and PC8 exhibit the highest overall influence.

Areas with **dense, modern infrastructure and high traffic volumes** are strongly associated with **higher** temperature, while areas with **greater green space, public facilities, and lower vehicle presence** tend to remain **cooler**.