

Introduction

Urban Heat Islands (UHIs): Urban areas with significantly higher temperatures than their rural surroundings.

- Loss of green spaces to impermeable surfaces drives UHI formation
- Climate change may spread heat disparities to smaller cities

Objectives

- Measure temperature variations across infrastructure densities in Syracuse, Utica, and Oneonta.
- Analyze UHI phenomena and compare with historical data
- Assess UHI overlap with at-risk or marginalized populations

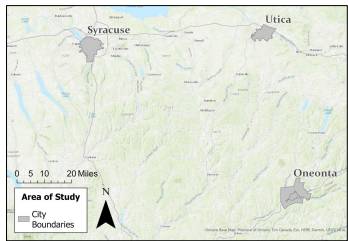


Figure 1: A reference map for our three study locations, Syracuse, Oneonta, and Utica.

Methods

UHI phenomena was assessed using a collection of air temperature recordings.

- Syracuse and Utica: Citizen science approach with data from personal and public stations for July 2024
- Oneonta: Field recordings with anemometers and data loggers from July 17th – 24, supplemented by nearby weather station data

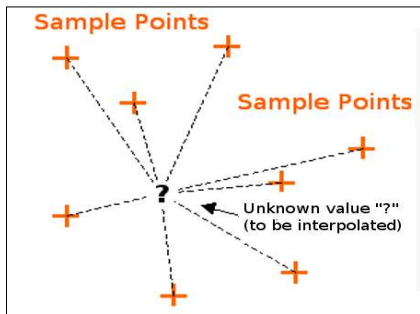


Figure 2: A simple visual of how Kriging works.

The averaged data were entered into ArcGIS Pro for Kriging interpolation and regression analysis

- Demographic data, resilience indicators, impervious surfaces, and tree canopy coverage for analysis

July 2024 Land Coverage And Temperatures

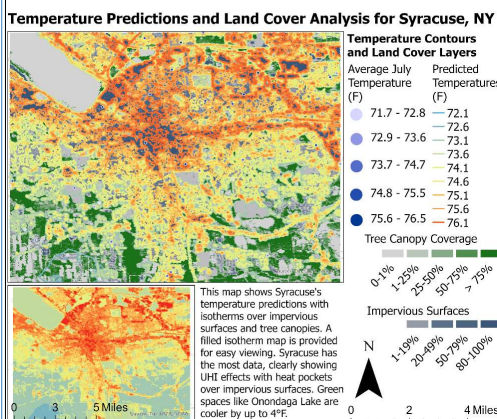
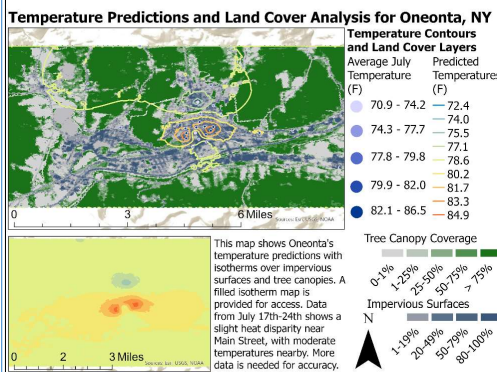
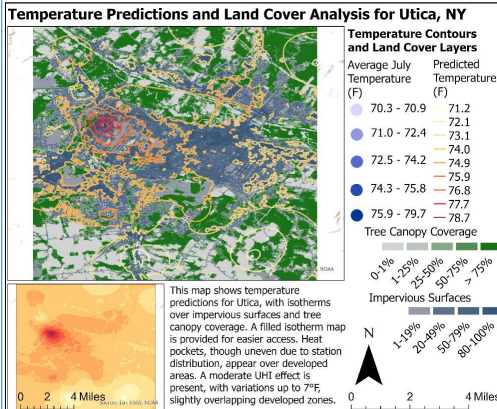


Figure 3: July 2024 UHI analysis for Utica, Oneonta, and Syracuse NY. Maps made by: Kevin Suchecki

Historical Land Coverage and Temperatures

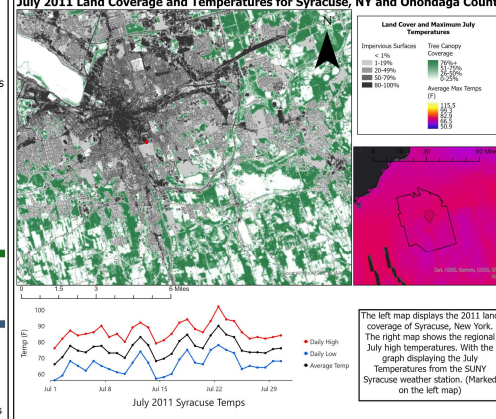
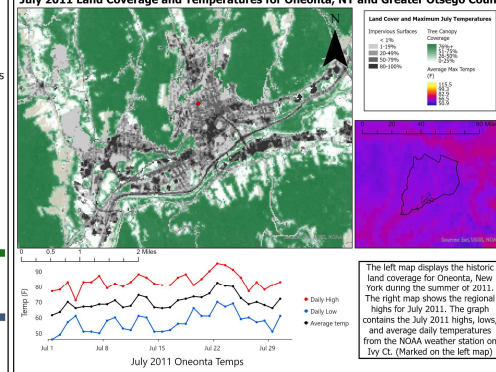
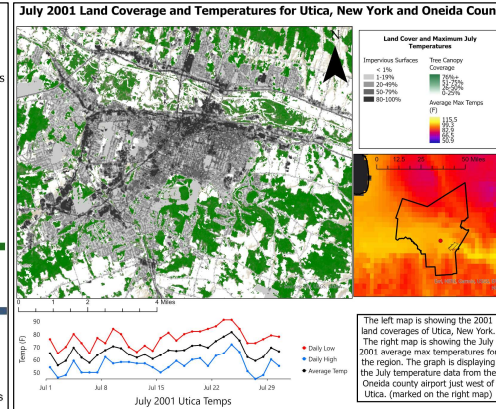


Figure 4: Historic UHI analysis for Utica, Oneonta, and Syracuse NY. Maps made by: Emmett Bird

July 2024 UHI Demographic Variables:

- July 2024 temperature summary by census tract is available via QR codes. Data includes demographics and vulnerability indicators. Select a tract on your device to view statistics



Figure 5: Demographic Variables Utica, NY

Figure 6: Demographic Variables Oneonta, NY

Figure 7: Demographic Variables Syracuse, NY

Results

Utica: Moderate UHI with heat pockets up to 7°F in variation;

- White majority, 30-40% low vulnerability city-wide, 17-30% high vulnerability in the center.

Oneonta: Minimal to no UHI; majority white, 40+ low vulnerability in three of five districts

Syracuse: Clear UHI with heat pockets; 4°F cooler near Onondaga Lake and suburbs;

- White majority increases towards outskirts. High vulnerability, 40-50%, in diverse, hotter central areas

All Areas: Impervious surface coverage has slightly increased across all three study areas from mapped to current conditions

Conclusion:

Small urban areas show varying UHI phenomena, vulnerabilities, and demographics. Next steps:

- Collect and establish more evenly spaced data to enhance accuracy and reduce error
- Fill gaps in areas Oneonta, reduce overall error

Count	38
Average CRPS	0.522161697382189
Inside 90 Percent Interval	92.1052631578947
Inside 95 Percent Interval	97.3684210526316
Mean	-0.00345145080146642
Root-Mean-Square	0.90490682723816
Mean Standardized	-0.00121734167589406
Root-Mean-Square Standardized	1.02471472806572
Average Standard Error	0.87984879700501

Table 1: Syracuse's predicted temperature statistics, note the high standard error despite having the most data points.

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