

Introduction

Methodology

Greenlink Analytics prepared an Urban Heat Island dataset for all (378) metropolitan statistical area (MSA) boundaries, in the United States, down to a census tract level, by converting census tract and metropolitan boundaries from the US Census Bureau to a geographic format.

The Google Earth Engine (GEE) Python API was leveraged to access MODIS Night Land Surface Temperature (LST). Temperatures, originally in Kelvin, were converted to Fahrenheit with a focus on May - August temperatures for each year of study.

Greenlink wrote code to convert the raw thermal data to a heat value in Fahrenheit for every 1km x 1km swath of land. The maximum values were outputted for each pixel in each summer month and then aggregated to census tract boundaries for each MSA.

A quantile analysis was then performed for each MSA to evaluate a “best month” that would signify the largest heat disparities within the MSA boundary. This was performed by integrating the heat data with the National Land Cover Database (NLCD) developed areas to evaluate the month that had the largest difference between areas that were >80% developed and <40% developed. A ranking system was then performed for each month and MSA combination and the top month was outputted into the final dataset for each MSA.

In the final dataset, “best month” temperature values were converted to a heat ranking using a percentile system. Percentiles were then converted to an urban heat intensity rating from 1 - 10. This allows each MSA to better understand how each individual census tract within its boundary performs compared to its neighbors. For example, an MSA that has an intensity rating of 8.7 means that it has a high urban heat intensity compared to other census tracts within the MSA boundary.

FAQ

- What is the difference between UHI and surface temperature?

There are several different temperatures that can describe a location. For the purpose of heat islands, land surface temperature (LST) is the most widely used and what Greenlink Analytics used to create the Urban Heat Index. Land surface temperature (LST) is the temperature that mirrors skin temperature, or the temperature felt at ground level due to the certain surfaces that are on the ground.