Feature

Keeping New York City "Cool" is the Job of NASA's "Heat Seekers" **01.30.06**

The "heat is on" in New York City, whether it's summer or winter. This is due to a phenomenon called the urban heat island effect that causes air temperatures in major cities to be warmer than in their neighboring suburbs and rural areas. And, in a big city, warmer air temperatures can impact air quality, public health and the demand for energy.

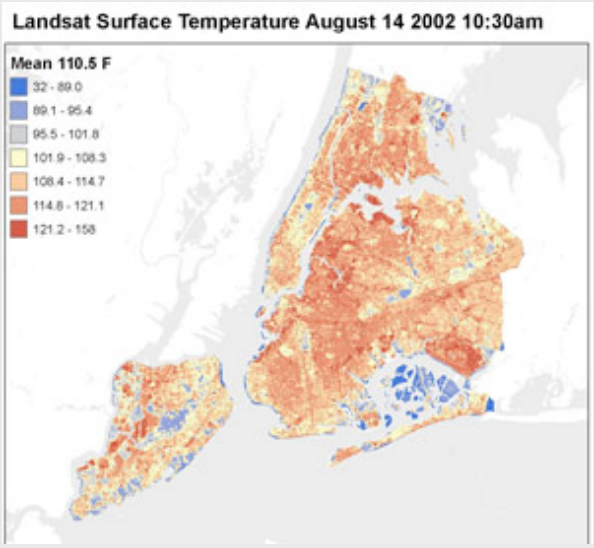

Image to right: A thermal satellite image of New York City captured by NASA's Landsat satellite on August 14, 2002 at 10:30 a.m., shows the locations of the warmest air temperatures as seen in red. The blue indicates areas with cooler air temperatures. **Click on image to enlarge.** Credit: NASA

However, several heat-busting strategies have recently been put in place that local officials and community groups believe will take a bite out of the Big Apple's temperature problem. NASA researchers have now taken a hard look at how well these strategies are working using a combination of NASA satellite observations, computer models and geographic mapping information.

"We need to help public officials find the most effective ways to cut the heat island effect in New York. With ever-increasing urban populations around the world, the heat island effect will become more significant in the future," said Stuart Gaffin, an associate research scientist at Columbia University, New York, and a co-author of the new NASA study.

In cities, the urban heat island effect is caused by the large number of buildings, sidewalks and other non-natural surfaces that limit the amount of land covered with vegetation such as grass and trees. Land surfaces with vegetation offer high moisture levels that cool the air when the moisture evaporates from soil and plants.

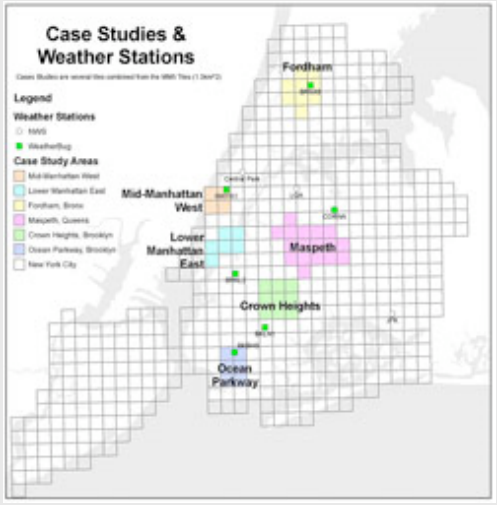

Image to left: This image indicates case study areas in New York City used in the NASA study, and weather stations. **Click on image to enlarge.** Credit: NASA

In cities such as New York, land surfaces with vegetation are relatively few. They are often replaced by non-reflective, water-resistant surfaces such as asphalt, tar and building materials that absorb most of the sun's radiation. These surfaces hinder the natural cooling that would otherwise take effect with the evaporation of moisture from surfaces with vegetation. The urban heat island occurrence is particularly pronounced during summer heat waves and at night when wind speeds are low and the sea breezes are light. During these times, New York City's air temperatures can get 7.2 degrees F higher than surrounding areas.

In the recent project, NASA researchers set out to make recommendations

to policy-makers on ways to reduce the urban heat island effect in New York City. They used a computer-based regional climate model to analyze the heat island effect in New York City and measure ways to reduce it by using light-colored surfaces that reflect sunlight; planting "urban forests," including vegetation at street level; and creating "living roofs" on top of buildings where sturdy vegetation can be planted and thrive.

Image to right: Times Square in New York City. Credit: Rob Gutro

The researchers measured changes in air temperatures across the city, analyzing six different neighborhoods. These areas were chosen because they were areas of high electrical use, had warmer than average near-surface air temperatures called "hot spots," and because they had available space to test ways to reduce the urban heat island effect.

"We found that vegetation is a powerful cooling mechanism. It appears to be the most effective tool to reduce surface temperatures," Gaffin said. "The other is a man-made approach to cooling by making very bright, reflected light on roof tops. These light-colored surfaces reflect the sun's light and thereby, its heat."

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