GLOBE: Study the Urban Heat Island Effect

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Mission EARTH
About Us
News & Events
Teacher Resources
Student Research
Community
Support
Partners
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GLOBE MISSION EARTH

Fusing GLOBE with NASA assets to build systematic innovation in STEM (Science, Technology, Engineering and Mathematics)

WELCOME!

GLOBE Mission EARTH is a collaborative of multiple institutions across the United States formed to increase involvement in the GLOBE Program (www.globe.gov). In addition to the members from our partner institutions, our group includes hundreds of other individuals including teachers, students and citizen scientists, located throughout the United States. More >>
Urban Heat Island Effect

![Urban Heat Island Effect Graph](http://farm4.staticflickr.com/3831/9971653914_b18df224c2_z.jpg)
What is the Urban Heat Island Effect (UHIE)?

Watch this NASA video below to find out!
GLOBE Urban Heat Island
Student Research Studies

Leave the IRT outside for 1 hour if the outdoor temperature is much different than the indoor temperature.

What Data to Collect and When

Dr. C needs YOU to collect and submit the following data to GLOBE:
- Cloud Data
- Air Temperature
- Surface Temperature

Take measurements on 5 different days within the following months:

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<th>Aug</th>
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<th>Oct</th>
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<td>Surface Temperature Field Campaign</td>
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Why do We Measure Surface Temperature?

- To help us understand the influences on the rate of heat exchange between the Earth’s surface and the atmosphere. This impacts the weather and climate and can help us understand Global Warming and the urban heat island effect.

The Energy Budget
How do I take my measurements?

HOW?
Hold your arm at arms length and point the instrument at the ground. After you pull the trigger then read the value including the tenths of a degree Celsius.
Caution!

Do not take the temperature of shadowed areas including the shadow that your body may cast.
Caution!

Extend your arm in front of you to take the observations. You don’t want to measure the temperature of your feet.
2. Collect GPS data of the center of each study area. Record latitude, longitude and elevation.
3. Take 9 random surface temperature readings

Take 9 random surface temperature readings within each study area. The 9 random observations ensure a good average for the site is observed.
Caution!

Do not mix cover types in one study area.

In this case, the study area mistakenly has grass *and* bare ground.
Welcome to GLOBE Mission EARTH's URBAN HEAT ISLAND EFFECT (UHIE) PAGE FOR STUDENTS!

Help Dr. C. by collecting Surface Temperature data near you, wherever you are in the world!

What is the Urban Heat Island Effect? It's when cities tend to be hotter than their surroundings due to all of the concrete and asphalt, and less trees. Dr. Kavlin Czajkowski ("Dr. C.") lead scientist for the GLOBE Program's Urban Heat Island Effect (UHIE) effort needs YOU to collect data near you to help us all understand this topic better! Use the links below to help you get started collecting your own data and sharing it with other students, all around the world.

Check out some photos and videos below of students participating in the UHIE Study!

Want to have YOUR photo or video shown on our page? Contact Web Developer and Research Assistant Sara Mierzwaik: sara.mierzwaik@usfd.edu

Photos of Students Around the World Collecting Data!

Videos of Our Participants!
Check out some amazing examples of projects completed by students who have investigated the UHI!

**URBAN HEAT ISLAND AT THE UNIVERSITY OF TOLEDO**

Check out this awesome project investigating the Urban Heat Island at the University of Toledo, by Graduate Student Tahimeth Ladi. This research is presented in the form of an ArcGIS Online Storymap.

**How do Navarre's Asphalt Surface Temperatures Compare with Ivano-Frankivsk City Environmental Station?**

Kadin C, Bryson W., Nicholas P., Schaw G., Dallas W., Jorge P.
Navarre Elementary, Toledo, Ohio
May, 2021

**Urban Heat Island Effect: Case Study on Croatia**

Jordan Doore, Undergraduate Student
Assessing the Effects of Surface Temperature and Tree Coverage in Select Suburban Parks

**Organization(s):** Crestwood High School  
**Country:** United States of America  
**Student(s):** Yasmina Abbas, Marwa Aidibi, Zainab Zaidan  
**Grade Level:** Secondary School (grades 9-12, ages 14-18)  
**GLOBE Teacher:** Diana Rae Johns  
**Contributors:** Mr. David Bydlowski and Mr. Andy Henry of the NASA AREN Program  
**Report Type(s):** International Virtual Science Symposium Report  
**Protocols:** Air Temperature, Surface Temperature  
**Presentation Poster:** View Document  
**Optional Badges:** Be a Data Scientist, Make An Impact, Be a STEM Professional  
**Language(s):** English  
**Date Submitted:** 03/11/2022
Need Urban Heat Island/Tree Studies

• Take surface temperature and air temperature observations (can use the GO app)
• Use the GO app to take tree height observations
• Compare in the sun and in the shade
• Map trees (through land cover) in your area
Surface temperature observations in the last 5 years
MODIS Terra LST vs. student surface temperature
Google Earth Engine, MODIS Land Surface Temperature


MOD11A1.061 Terra Land Surface Temperature and Emissivity Daily Global 1km

Dataset Availability
2000-02-24T00:00:00Z - 2022-03-25T00:00:00

Dataset Provider
NASA LP DAAC at the USGS EROS Center

Earth Engine Snippet
```
ee.ImageCollection("MODIS/061/MOD11A1")
```

Tags
daily, emissivity, global, lot, mod11a1, modis, nasa, surface-temperature, terra, usgs

Description
The MOD11A1 V6.1 product provides daily land surface temperature (LST) and emissivity values in a 1200 x 1200 kilometer grid. The temperature value is derived from the MOD11_L2 swath product. Above 30 degrees latitude, some pixels may have multiple observations where the criteria for clear-sky are met. When this occurs, the pixel value is the average of all qualifying observations. Provided along with both the day-time and night-time surface temperature bands and their quality indicator layers are MODIS bands 31 and 32 and six observation layers.
Google Earth Engine, MODIS Land Surface Temperature
Other Resources

https://mynasadata.larc.nasa.gov/lesson-plans/creation-urban-heat-islands-story-map

Email me if you would like to join our Google Classroom – kevin.Czajkowski@utoledo.edu
NASA Urban Heat Island Badge

Create an account to see the pages offered.
Self-paced
Time: Less than 10 hours.

https://www.nasa.gov/audience/foreducators/best/badging.html
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