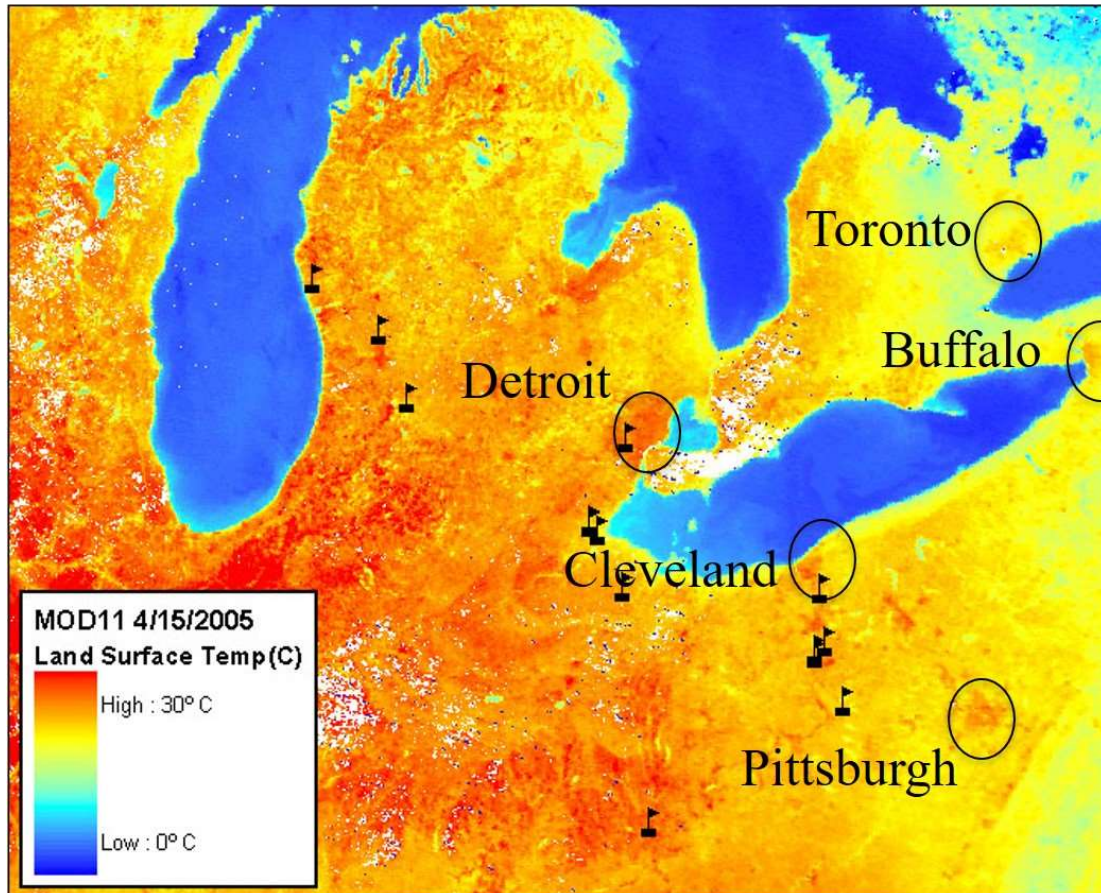


GLOBE: Study the Urban Heat Island Effect



Kevin Czajkowski
*Department of Geography
and Planning
The University of Toledo*



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globe.gov/web/mission-earth

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Mission EARTH (Widget Page)

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A Worldwide Science and Education Program

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Tennessee State University

Institute for Earth Observations - Palmyra, NJ

NASA Langley Research Center

Engineering Connections

 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 >>](#)



pc-mobility-print-...exe 2020-home-traile-...mp4

Show all

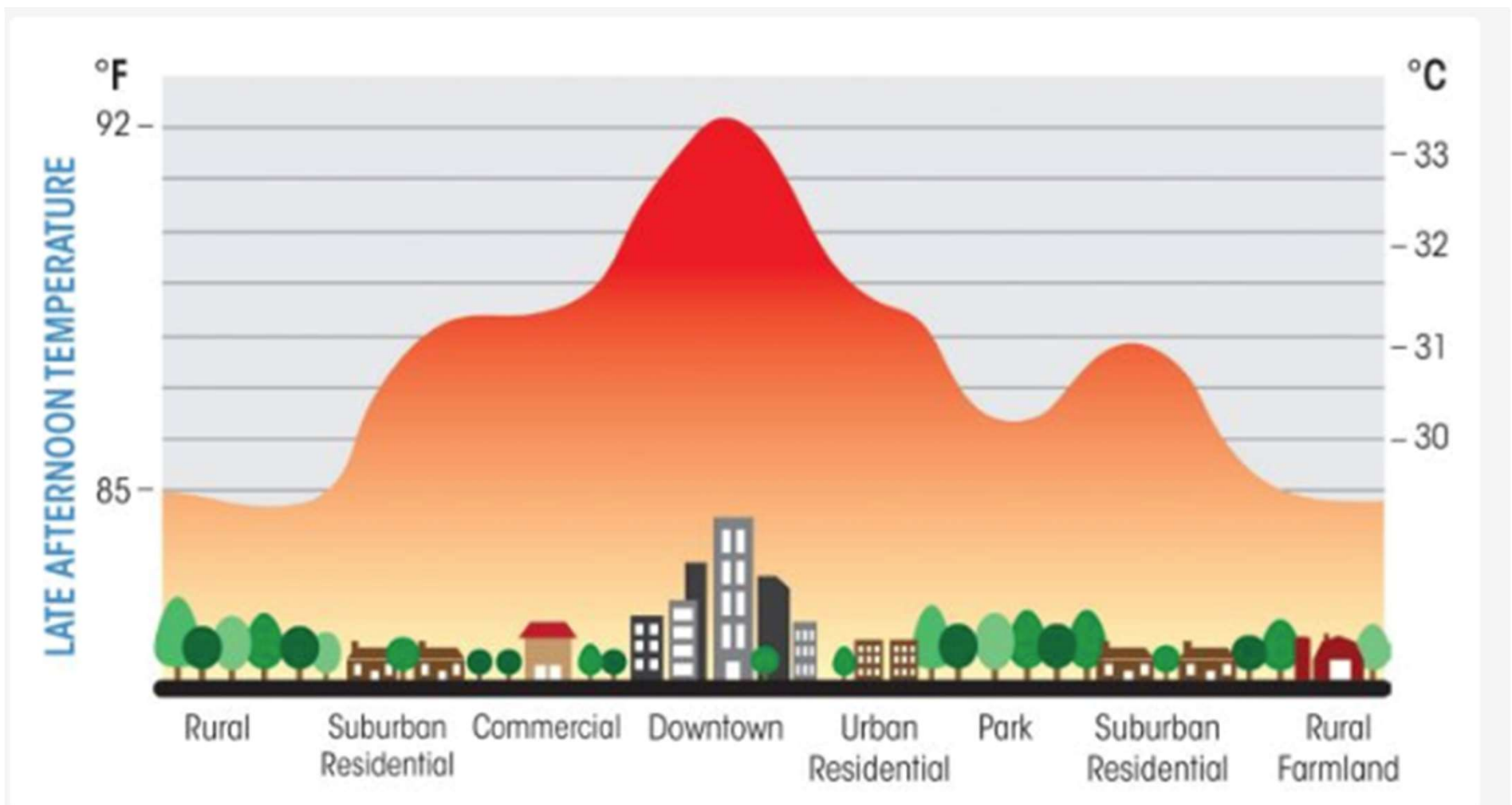
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THE GLOBE PROGRAM
A Worldwide Science and Education Program

Urban Heat Island Effect



Urban Heat Island Effect

GLOBE Field Campaign

globe.gov/web/surface-temperature-field-campaign/overview



Home > UHIE-Surface Temperature

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Science of the Surface Temperature Field Campaign

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Discussions & Group Documents

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:

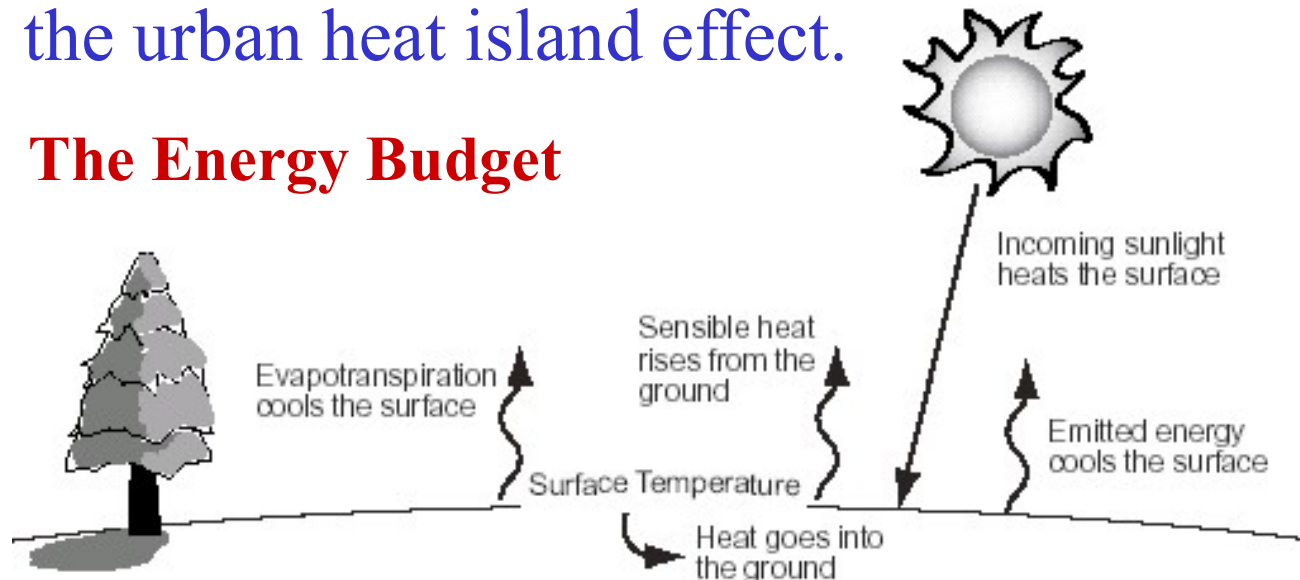


	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Surface Temperature Field Campaign			X		X			X				

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?



Photo credit: Kevin Czajkowski

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.



A. What is surface temperature?

B. Why collect surface temperature data?

C. How your measurements can help!

D. How to collect your data.

E. How to report data to GLOBE.

F. Understand the data.

G. Quiz yourself!

H. Further resources.



Caution!

Extend your arm in front of you to take the observations. You don't want to measure the temperature of your feet.

A. What is surface temperature?

B. Why collect surface temperature data?

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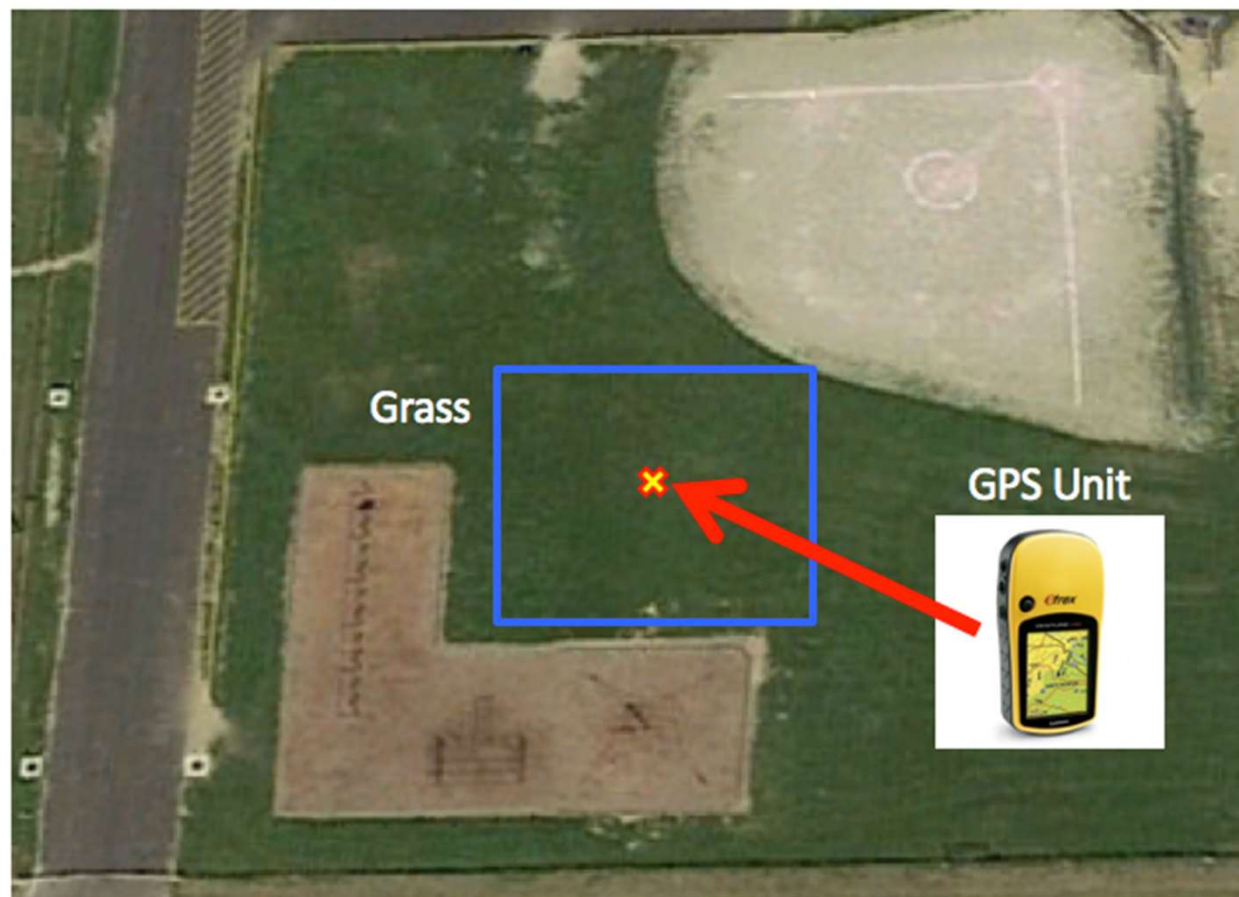
F. Understand the data.

G. Quiz yourself!

H. Further resources.

2. Collect GPS data of the center of each study area.

Record latitude, longitude and elevation.





A. What is surface temperature?

B. Why collect surface temperature data?

C. How your measurements can help!

D. How to collect your data.

E. How to report data to GLOBE.

F. Understand the data.

G. Quiz yourself!

H. Further resources.

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.





A. What is surface temperature?

B. Why collect surface temperature data?

C. How your measurements can help!

D. How to collect your data.

E. How to report data to GLOBE.

F. Understand the data.

G. Quiz yourself!

H. Further resources.

Caution!

Do not mix cover types in one study area.

In this case, the study area mistakenly has grass *and* bare ground.



https://sites.google.com/view/uhieforstudents

Weather Radar | Weat x | Mail - Czajkowski, Ke x | Fantasy Football: Woll x | Vintage Star Wars Dai x | Temperance, MI 10-D x | Calendar - Czajkowski x | UHIE for Students x

← → ↻ ⌂ sites.google.com/view/uhieforstudents ⌵ 🔍 ⚙️ 👤 ⋮

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UHIE FOR STUDENTS

Home ▾ 🔍



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. Kevin 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 Mierzwiak: sara.mierzwiak@utoledo.edu



[Photos of Students Around the World Collecting Data!](#)



[Videos of our Participants!](#)

HOW TO PARTICIPATE

5:27 PM

<https://sites.google.com/view/uhieforstudents/home/completed-student-projects?authuser=0>

STUDENTS

COMPLETED STUDENT PROJECTS

Check out some amazing examples of projects completed by students who have investigated the UHIE!



Urban Heat Island at the University of Toledo

Tahmineh Ladi
October 18, 2021

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 Tahmineh Ladi. This research is presented in the form of an ArcGIS Online Storymap!

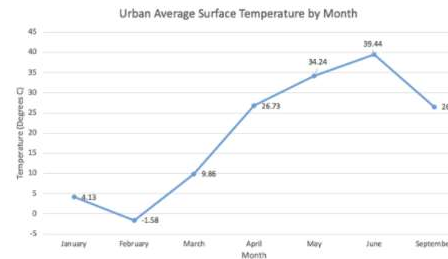
How do Navarre's Asphalt Surface Temperatures Compare with Ivano-Frankivsk City Environmental Station?

Kadin C., Bryson W., Nicholas P.,
Schawn G., Dallas W., Jorge P.

Navarre Elementary, Toledo, Ohio
May, 2021

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

Kadin C., Bryson W., Nicholas P., Schawn G., Dallas W., & Jorge P., Elementary



Urban Heat Island Effect: Case Study on Croatia

Jordan Doore, Undergraduate Student

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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

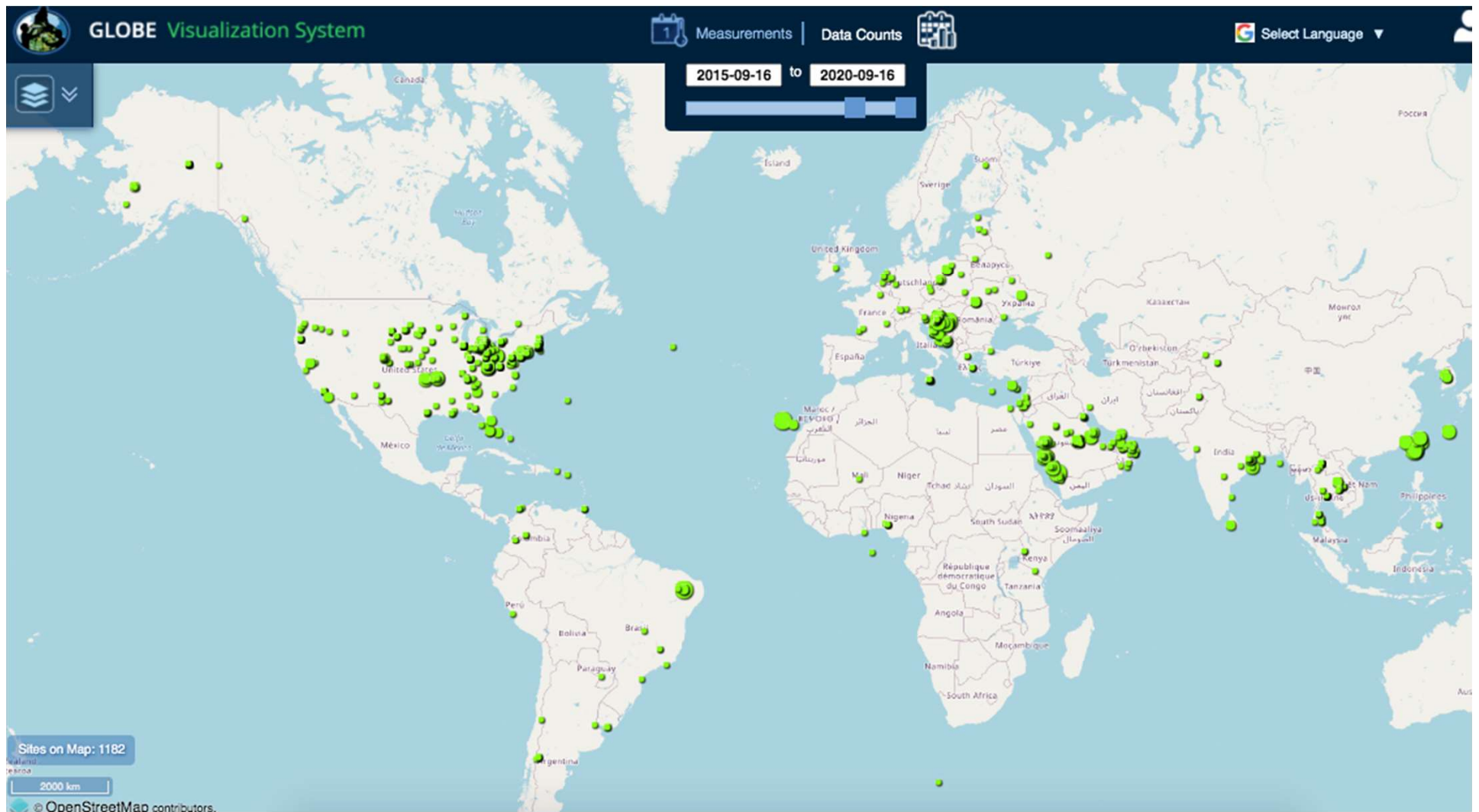


Need Urban Heat Island/Tree Studies

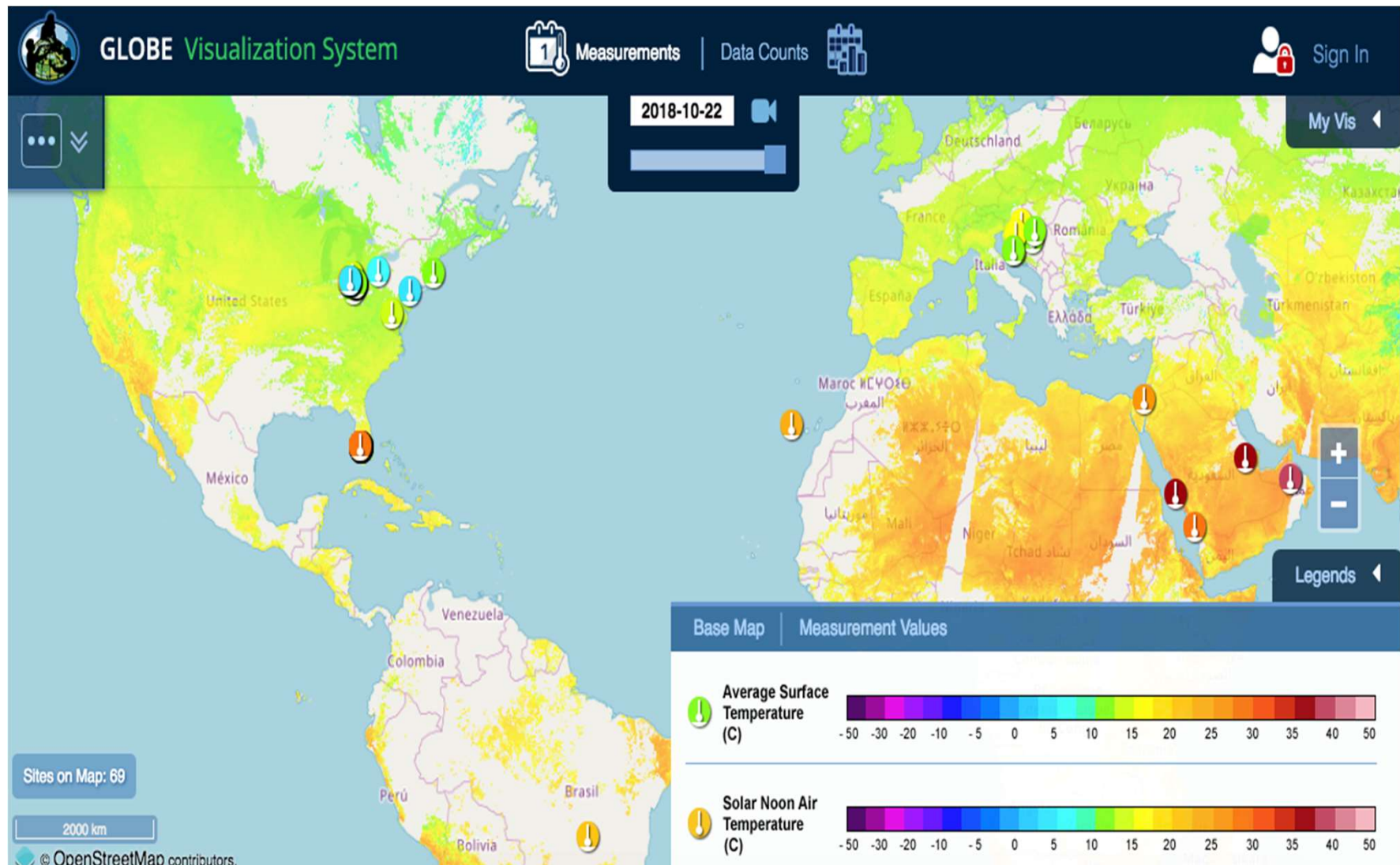
- Take surface temperature and air temperature observations (can use the GO app)
- Use the GO app to take tree height observations
- Compare in the sun and in the shade
- Map trees (through land cover) in your area



Surface temperature observations in the last 5 years

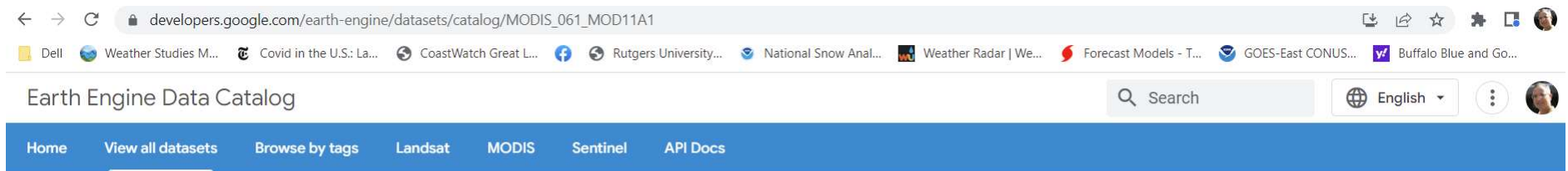


MODIS Terra LST vs. student surface temperature

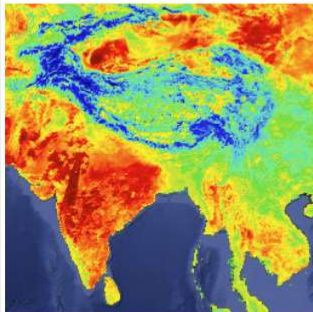


Google Earth Engine, MODIS Land Surface Temperature

https://developers.google.com/earth-engine/datasets/catalog/MODIS_061_MOD11A1



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 lst mod11a1 modis nasa surface-temperature terra usgs

Description

Bands

Terms of Use

Citations

DOIs

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.

[Documentation](#)

Google Earth Engine, MODIS Land Surface Temperature

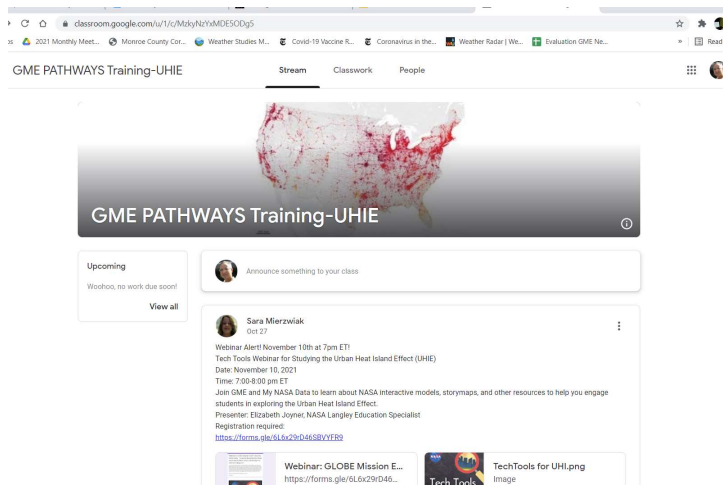
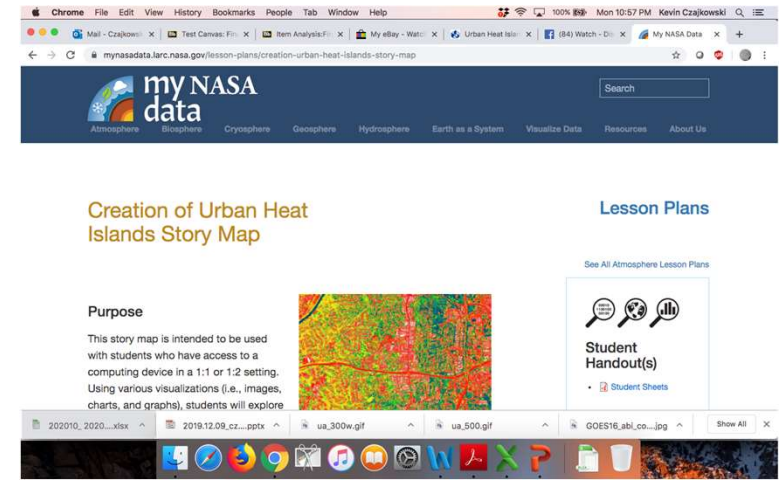
The screenshot displays the Google Earth Engine web interface. The browser address bar shows the URL: `code.earthengine.google.com/?scriptPath=Examples%3ADatasets%2FMODIS_061_MOD11A1`. The interface includes a search bar, a sidebar with 'Scripts', 'Docs', and 'Assets' tabs, and a main editor area for a script titled 'MODIS_061_MOD11A1 *'. The script code is as follows:

```
1 var dataset = ee.ImageCollection('MODIS/061/MOD11A1')
2   .filter(ee.Filter.date('2021-07-01', '2021-09-01'));
3 var landSurfaceTemperature = dataset.select('LST_Day_1km');
4 var landSurfaceTemperatureVis = {
5   min: 13000.0,
6   max: 16500.0,
7   palette: [
8     '040274', '040281', '0502a3', '0502b8', '0502ce', '0502e6',
9     '0602ff', '235cb1', '307ef3', '269db1', '30c8e2', '32d3ef',
10    '3be285', '3ff38f', '86e26f', '3ae237', 'b5e22e', 'd6e21f',
11  ]
12 }
```

The map view shows a satellite image of the Gulf of Mexico and surrounding landmasses, including Florida, Cuba, and parts of Central America. The map is color-coded to represent land surface temperature, with a color scale ranging from blue (cooler) to red (warmer). The map includes a scale bar (100 km) and a 'Show all' button. The bottom of the screen shows a Windows taskbar with various application icons and the system clock indicating 8:32 AM on 4/6/2022.

Other Resources

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



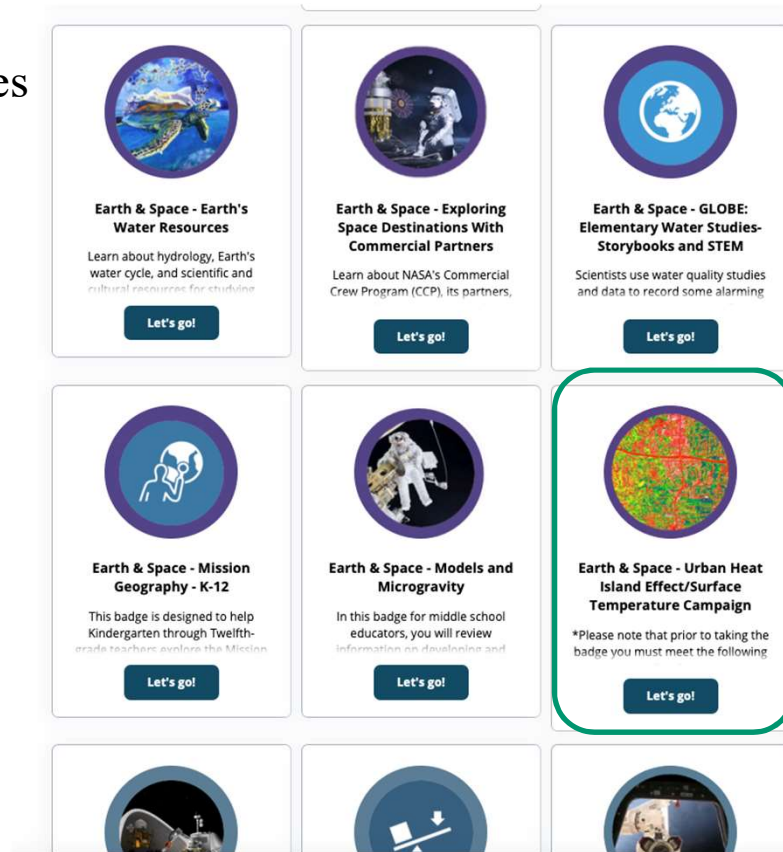
Email me if you would like to join our
Google Classroom –
kevin.Czajkowski@utoledo.edu

NASA Urban Heat Island Badge

Create an account to see the pages offered.

Self-paced

Time: Less than 10 hours.



You need to be GLOBE Trained.

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

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