Exposing Underrepresented Groups to Climate Change and Atmospheric Science Through Service Learning and Community-Based Participatory Research

Dr. David A. Padgett
Associate Professor of Geography
Tennessee State University
Nashville, Tennessee

Hurricane Katrina

New Orleans, Louisiana

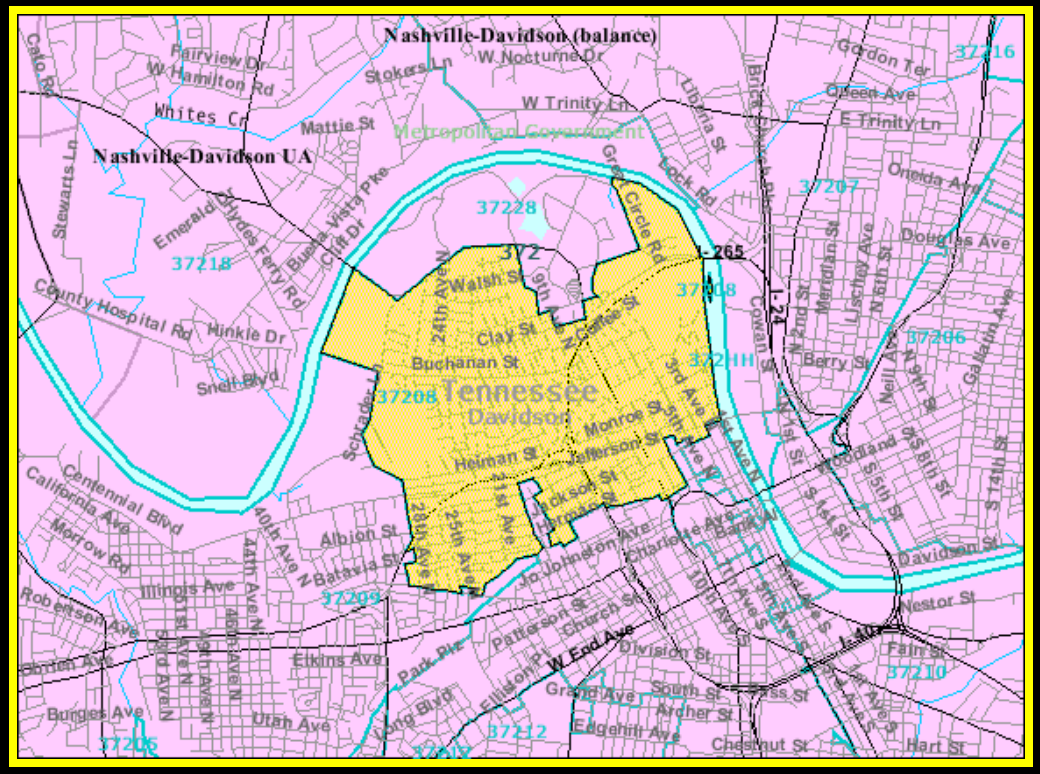
August 29, 2005

Exposed inner-city populations' increased **vulnerability** to extreme weather events.

Nashville's 37208 Zip Code Area: A potentially <u>vulnerable</u> population

- Approximately 93% of the community is African American.
- Among the 9,945 occupied households in the area, 7.4% rely on public transportation as their way to work (the Nashville-Davidson County average is about 2.0%)
- 16.5% have no vehicles available
- 66% of residents live at or below the poverty level.

Source: U.S. Census



Mapping Nashville's Red Cross Emergency Shelters with Geospatial Technology: A Pearl-Cohn High School and TSU Community Engagement Partnership

2008-2009

American Red Cross

Pearl Cohn High School

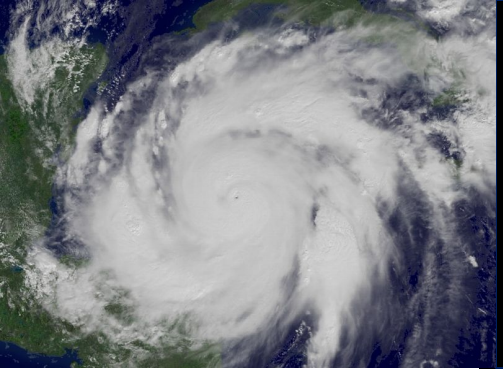
STATE FARM INSURANCE

PCAEIS

TSU Pilot Center for Academic Excellence in Intelligence Studies

TENNESSEE STATE UNIVERSITY

TSU Geographic Information Sciences Laboratory

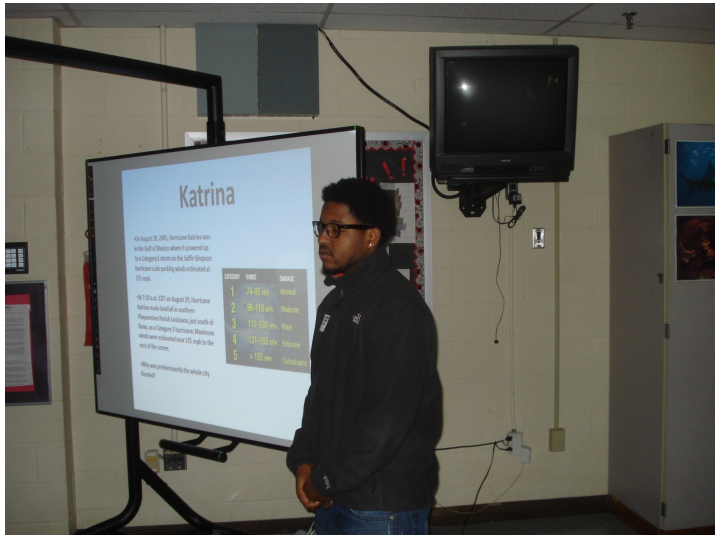


Project Background

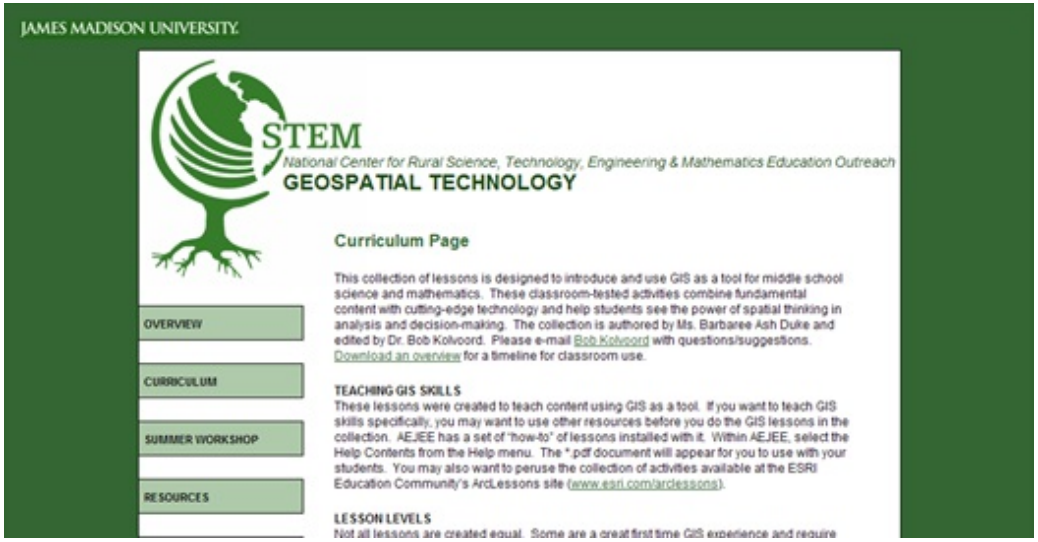
- During the 2008-2009 academic year Tennessee State University (TSU) students enrolled in two service learning courses, Weather & Climate (GEOG 3500) and Urban Geography (GEOG 4850), exposed Pearl-Cohn High School students to data and information related to inner-city emergency preparedness and response.
- The TSU volunteers assisted their Pearl-Cohn mentees in using geographical information systems (GIS) and global positioning systems (GPS) to map locations of Nashville Red Cross emergency shelters.
- The Pearl-Cohn students were enrolled in Mrs. Debbie Hirsch's Technology Class. The project is funded by a State Farm Good Neighbor Service Learning Grant and supported in part by the TSU Pilot Center for Academic Excellence in Intelligence Studies.

Undergraduate TSU students enrolled in the fall 2008 Weather & Climate (GEOG 3500) course are required to develop and teach learning modules for Pearl-Cohn High School students on the dynamic impacts of hurricanes and applications of geographic information systems (GIS) in extreme weather disaster response and preparedness.

Pearl-Cohn's enrollment is 93% African American with 93% of students qualifying for the free and reduced price lunch program.



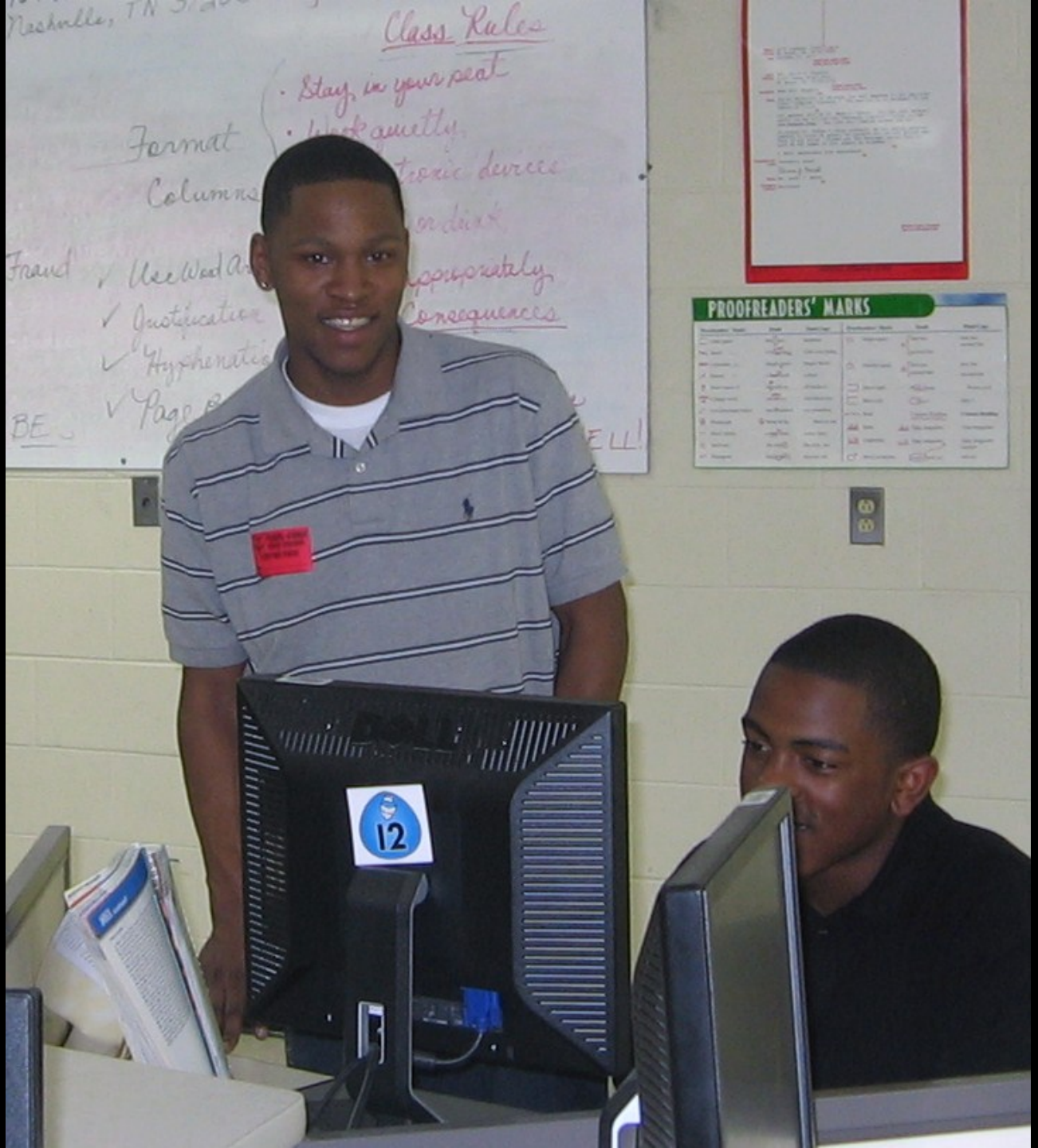
The *Teaching the Levees* Curriculum – based upon Spike Lee's documentary "When the Levees Broke"



Free Geospatial Technology learning modules for high school students - James Madison University

Academic year 2008-2009: TSU Weather & Climate (GEOG 3500) and Urban Geography (GEOG 4850) students worked with Pearl-Cohn High School students using ArcGIS Desktop software to produce emergency shelter maps for the Nashville Red Cross Chapter.


WORDS
THINK
SPEAK


Class Rules
Stay in your seat
Format
PROOFREADERS' MARKS
12

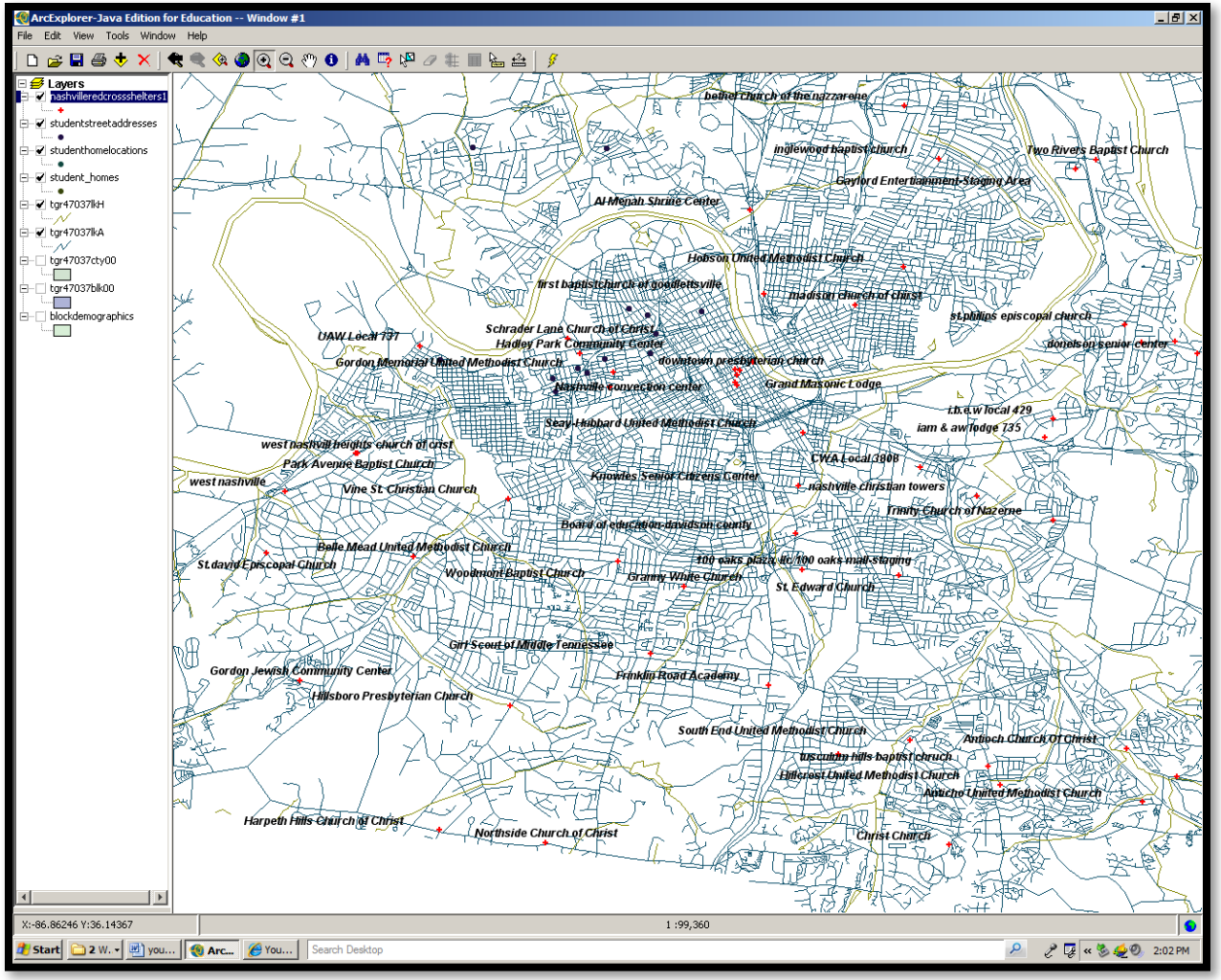

SYNERGY
DELL
19


Let learning take you around the wo
JA Success Skills
Nashville
PUBLIC SCHOOLS
DELL

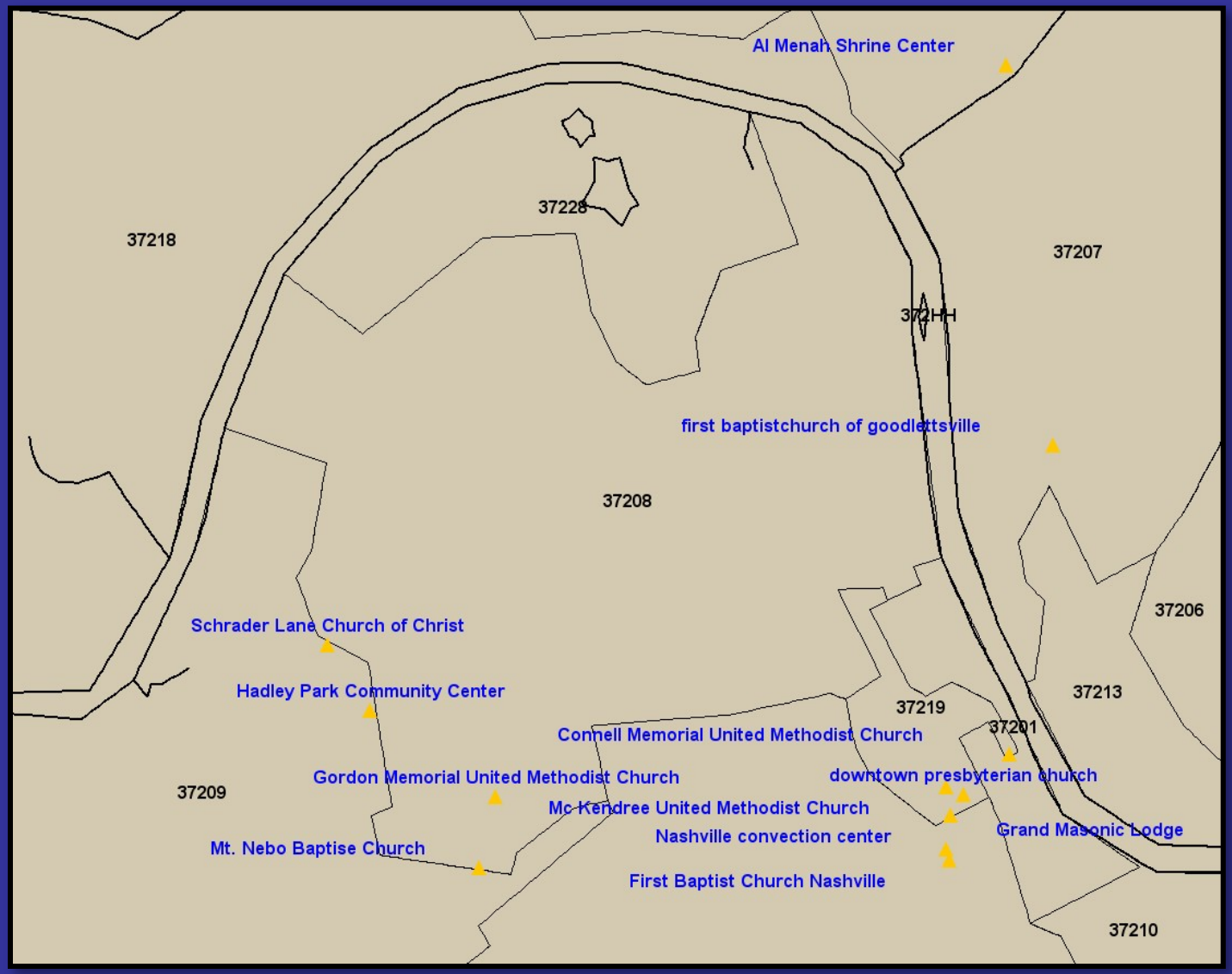

RIDE OR DIE

Project Outcomes

May 2009 - The Pearl-Cohn High School students produced the first maps of the locations of Nashville's Red Cross Emergency Shelters. Prior to this project, no such maps existed.



May 2009 – The TSU/Pearl-Cohn High School Red Cross Emergency Shelters mapping project reveals that one of Nashville's most vulnerable communities, the 37208 zip code area, is underserved in terms of emergency shelter availability. Pearl-Cohn High School is located within the 37208 zip code area.



June 2009 - For producing the first maps of emergency shelters for the Nashville Chapter of the American Red Cross, each Pearl-Cohn High School student and their teacher, Mrs. Debbie Hirsch, was presented a volunteer award certificate

Fall 2009 – The Nashville Office of the American Red Cross partners with the National Baptist Convention USA to recruit its member churches to serve as Red Cross Emergency Shelters.

Approximately 85 percent of the shelters are maintained by faith-based organizations.

DAVIDSON COUNTY

Baptist group, Red Cross team up

The Nashville-based National Baptist Convention USA signed an agreement Thursday that opens its member churches to being disaster relief shelters for the American Red Cross.

The partnership also provides the nation's largest African-American religious organization the resources to offer more disaster relief training to pastors and members.

Rev. Randy Vaughn, director of the office of disaster management for the convention, said the partnership seemed a natural fit.

"Our buildings can be used as shelters, we can become points of distribution, mass feeding and care, even helping liaison with the community," he said. "It is our hope, after proper praying and so forth, that we will have a large force of National Baptists working alongside volunteers from the Red Cross and other agencies."

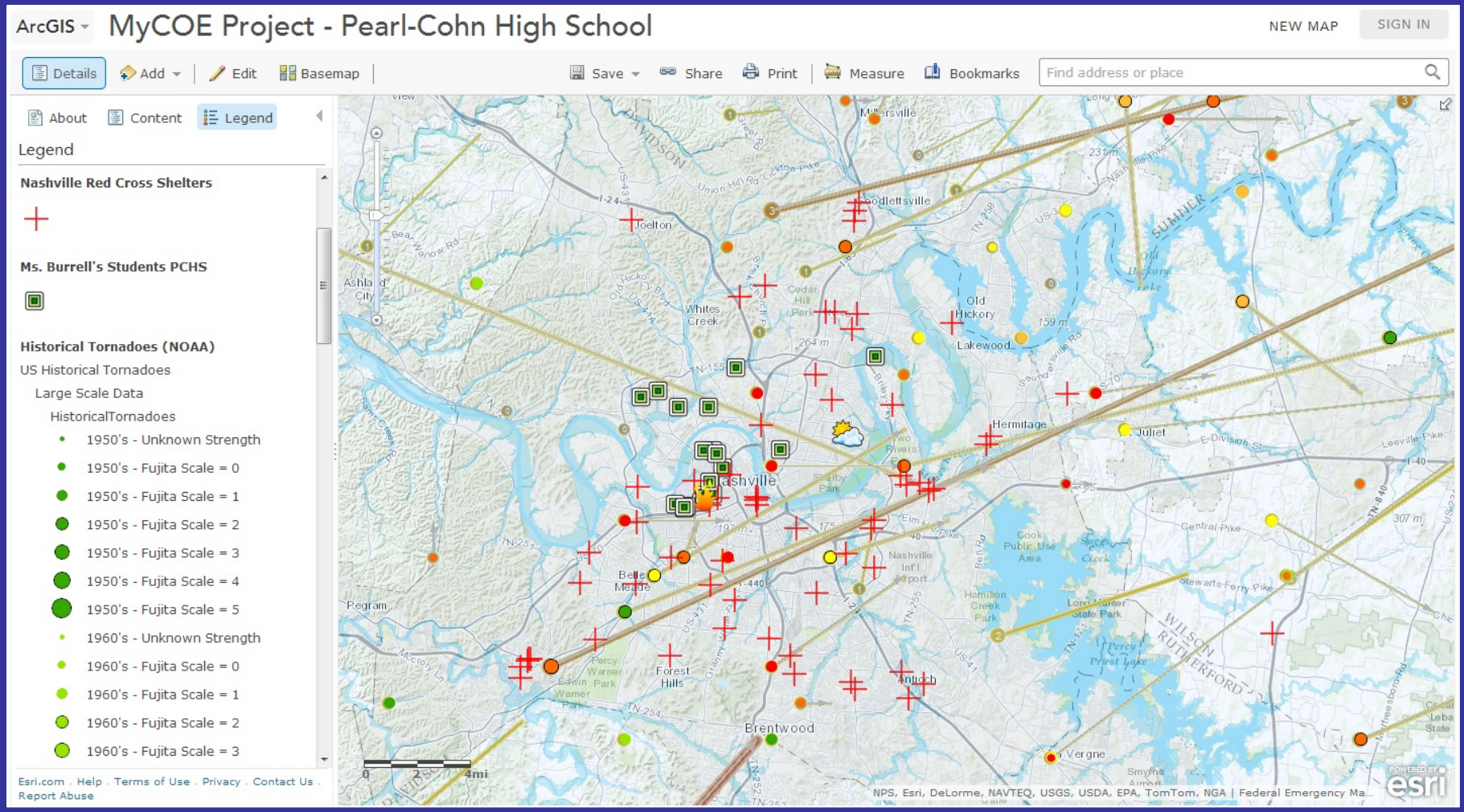
He said Hurricanes Katrina and Rita in 2005 awakened the convention to the need to organize its disaster efforts. The convention includes more than 16,000 churches.

— HEIDI HALL
THE TENNESSEAN

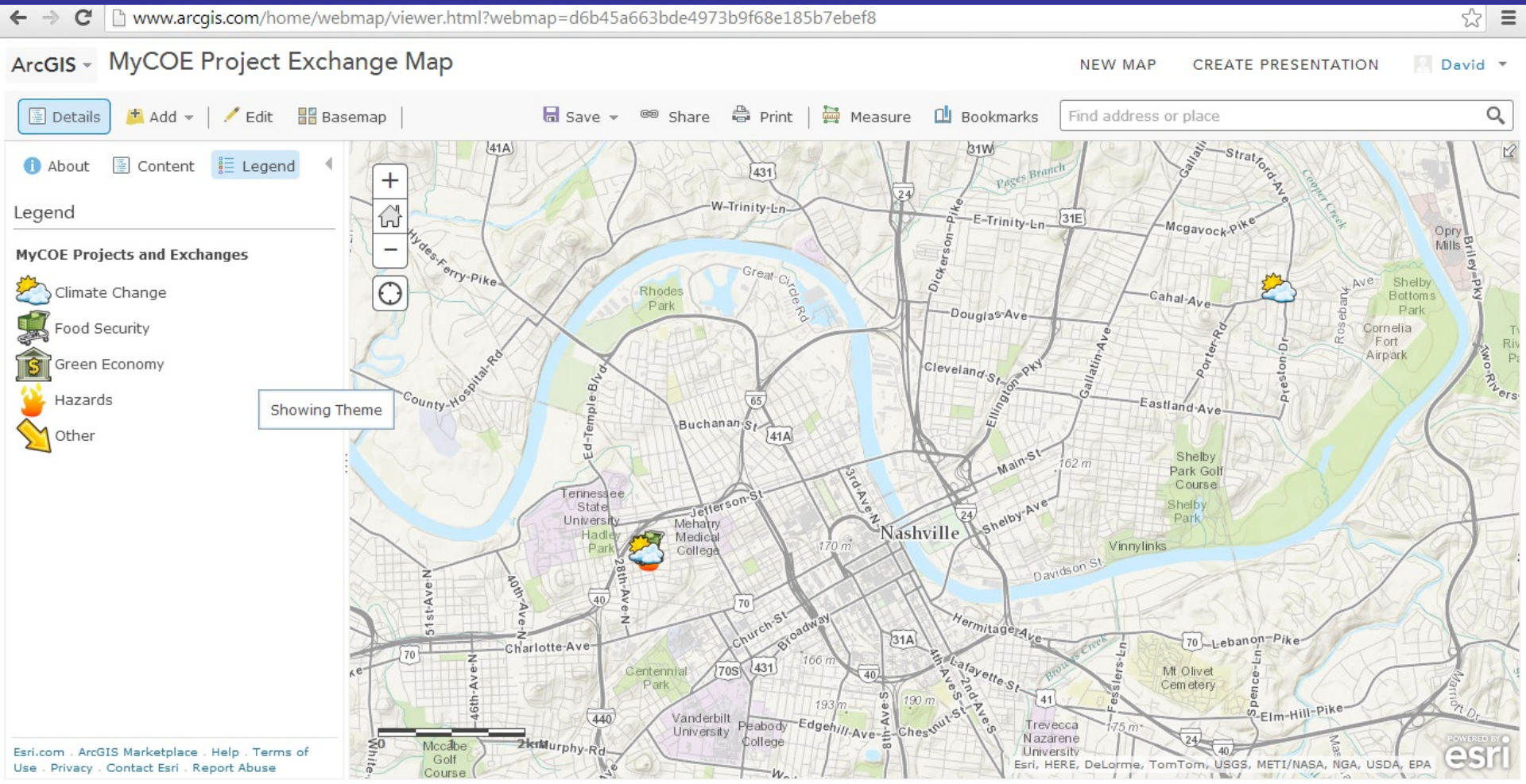
May 2010 - Nashville, Tennessee : 500-1000 Year Flood Event

- Worst flooding in 140 years
  - 500-1000 year flooding
  - 17 inches of rain in 2 days
- Cumberland River crested at 52 feet
  - 12 ft above the flood stage
- Release of water by the Army Corps of Engineers
  - Protect critical structures
  - Potentially increased flooding
- $2 Billion in damages
- Over two dozen fatalities
- More than 10,000 people displaced

The predominantly African American and low-income population in and near the 37208 zip code area was significantly impacted by the 2010 flood, in part due to lack of emergency shelters.

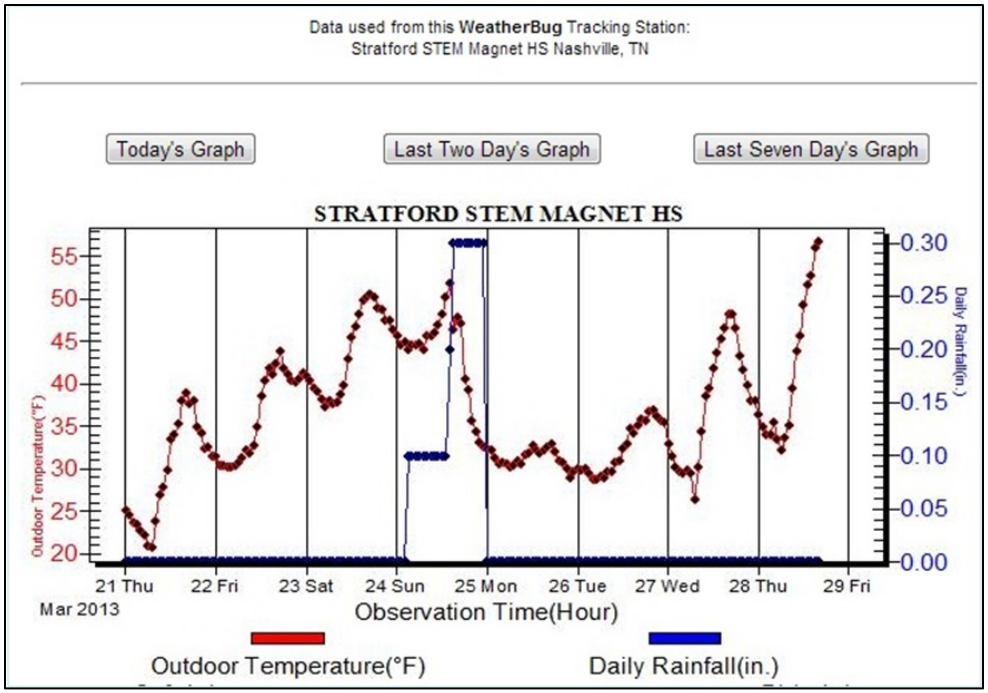


Fall 2012 – Weather & Climate (GEOG 3500) course students worked with Ms. Yolanda Burrell's Pearl-Cohn High School Physical Sciences class to produce a My Community, Our Earth (www.mycoe.org) "Investigating Hazards Activity" online mapping project based upon emergency preparedness for extreme weather hazards.



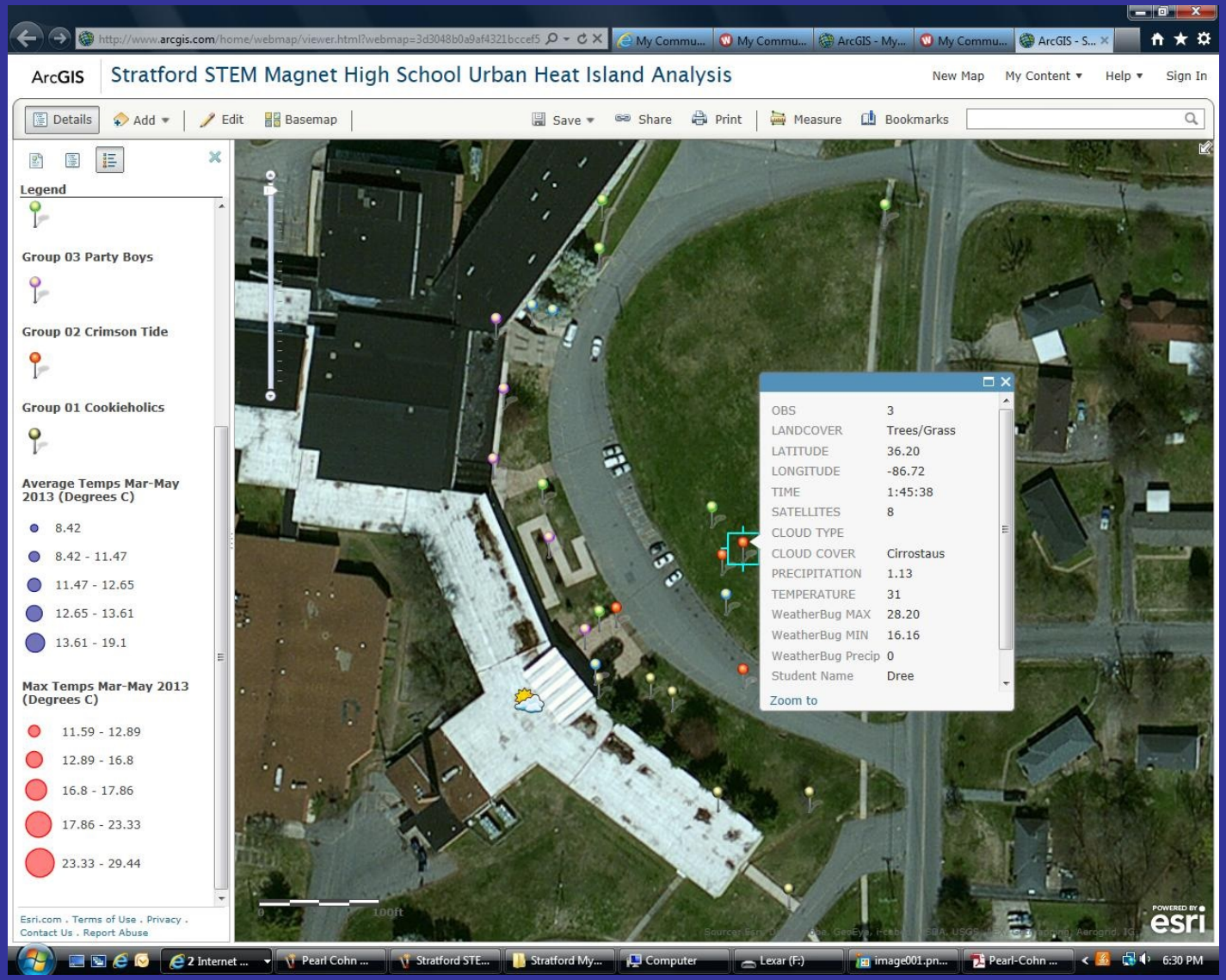
The Pearl-Cohn High School and Stratford STEM Magnet High School projects on the MyCOE (www.mycoe.org) Project Exchange Map, created using ArcGIS Online (www.arcgis.com)
Nashville, Tennessee

Summer 2013 - Undergraduate TSU students enrolled in Weather & Climate (GEOG 3500) course were required to develop and teach learning modules for Stratford STEM Magnet High School students based upon the Global Learning and Observations to Benefit the Environment (GLOBE) (www.globe.gov) Atmosphere Protocol. The lesson was supplemented with geospatial technology applications and data from the school's WeatherBug station. **Stratford's enrollment is 68% African American, 6% Hispanic with 91% of students qualifying for free/reduced price lunch.**

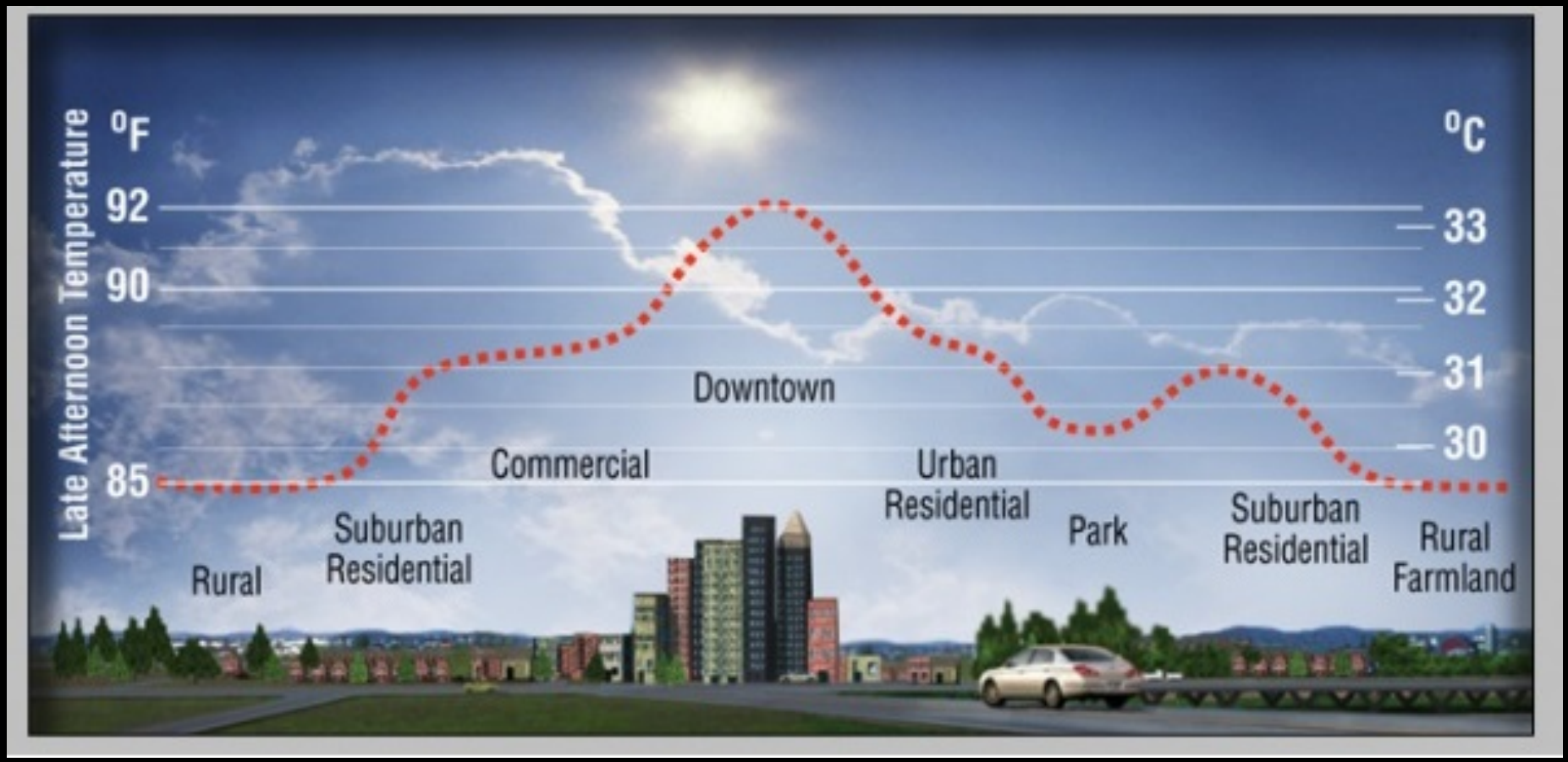


Summer 2013 - Precipitation, temperature, and cloud cover data were collected per the GLOBE Atmosphere Protocol. GPS receivers were used to record data collection point locations on Stratford's campus.

Summer 2013 – Weather & Climate (GEOG 3500) students worked with Stratford students enrolled in Ms. Allison McVey's AP Geography course on a My Community, Our Earth "Ecological Footprint" project entitled "**Urban Heat Islands Analysis**".



URBAN HEAT ISLAND SCHEMATIC



https://heatisland.lbl.gov/coolscience

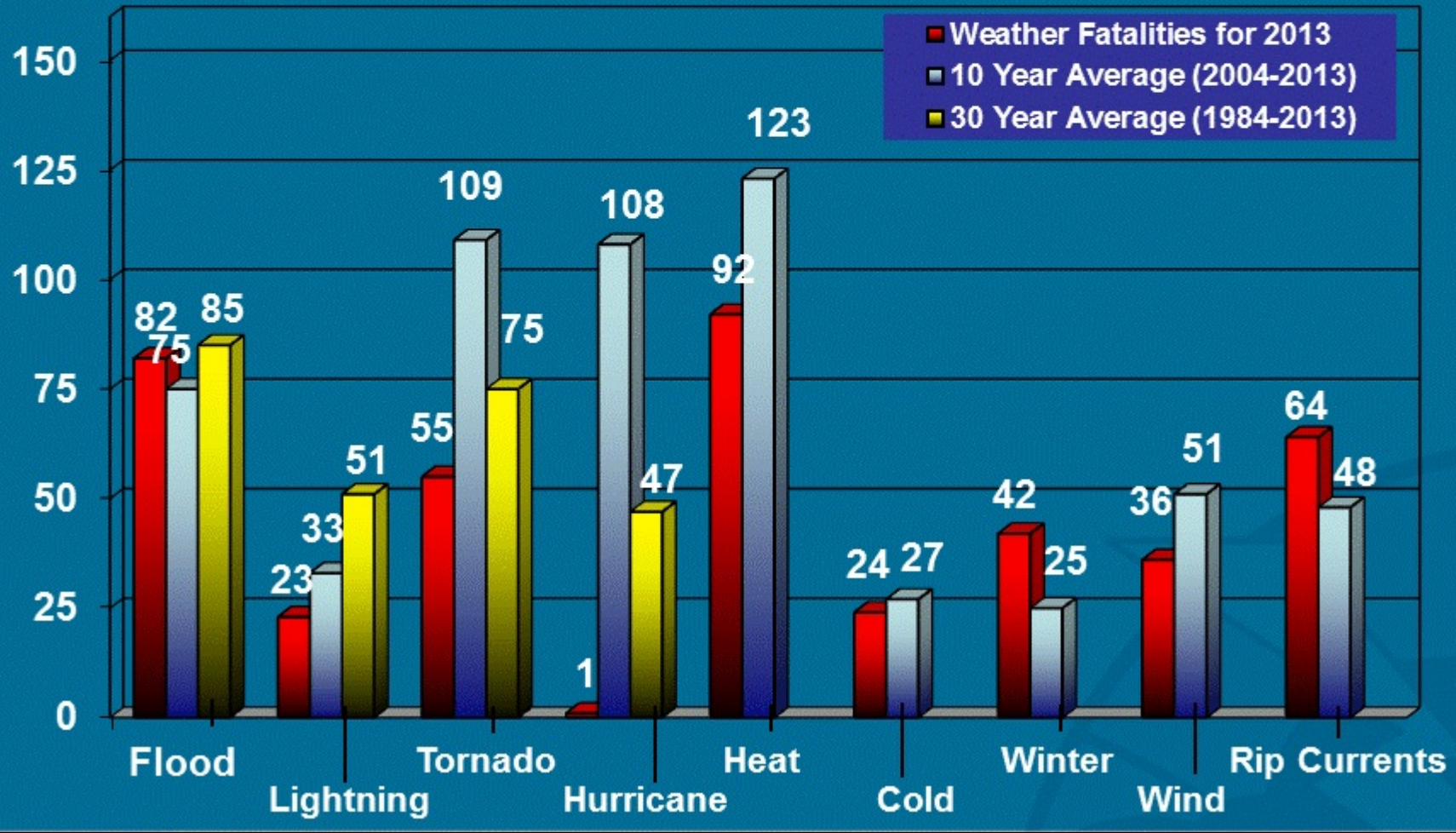
URBAN HEAT ISLAND IMPACTS

Effects

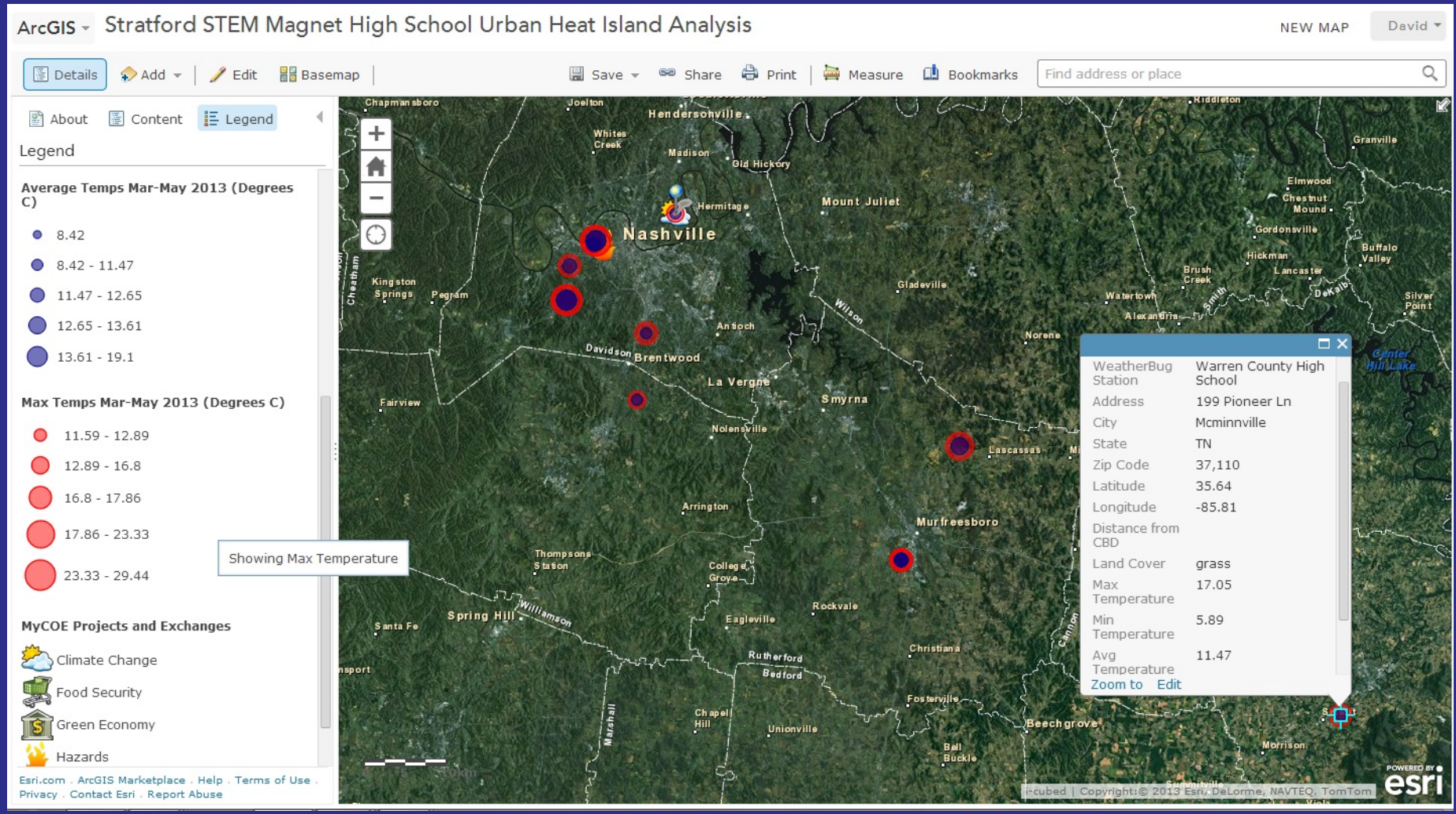
- Direct influence the health and welfare of urban residents.
- Requires more energy for cooling purposes => increases emissions and electric consumption
- Increases precipitation in cities and areas downwind of cities.
- Enhances photochemical reactions, which increases the particles in the air and thus contributes to the formation of smog and clouds.
- Culprit for global warming.
- Affects rain pattern in summertime.

http://www.slideshare.net/cedarpanasonic/urban-heat-island-proposal-cedar

Weather Fatalities



Summer 2013 - Maximum and Average Daily Temperature data recorded by the Stratford High School WeatherBug Station and other regional stations for March-May 2013 were downloaded and analyzed with regard to effect of land cover upon observed temperatures.



Summer 2014 – Students enrolled in TSU's Weather & Climate (GEOG 3500) course led Pearl-Cohn High School students in an outdoor exercise using infrared thermometers and GPS receivers to map the temperatures of various land covers surfaces in order to understand the concept of "Urban Heat Islands."

Pearl-Cohn High School Urban Heat Islands GPS Data Work Sheet

Name of Person Collecting Data Sylvia [redacted] Email [redacted]@gmail.com Date 5-23-14

School Campus Covered Pearl-Cohn Magnet High school Team Name Big Blue

Datum NAD 83 GPS Unit Serial Number 1936 a2 d3

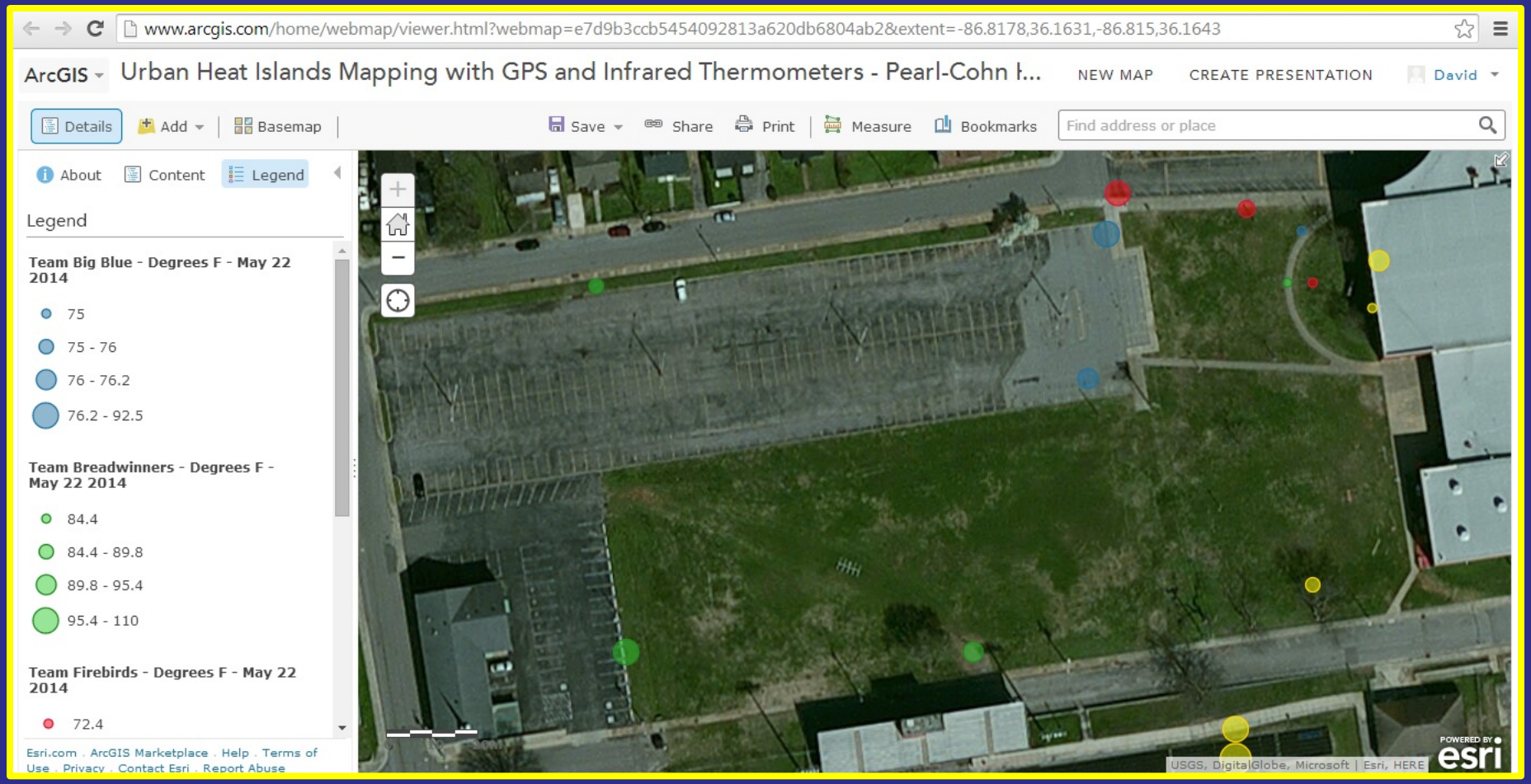
GPS Unit Name Brand and Model Garmin

Site Name	Location	Temp (°F)	Land cover Description	Latitude	Longitude	Cloud Cover (%)	Cloud Type(s)
PCHS sign	15ft SE PCHS sign	75°	urban grass	36.16416	86.81551	55%	Cirrus cumulus
The loop	75ft SE of PCH sign	76°	urban trees grass/shrubs	36.16435	86.81555	55%	Cirrus cumulus
3 Parking lot	150ft E of PCH entrance	82.5°	Pavement concrete	36.16445	86.81558	55%	Cirrus cumulus
Practice field	150ft NW of PCH sign	76.2°	urban grass	36.16527	86.81605	55%	Cirrus Cumulus

Pearl-Cohn HS Urban Heat Island GPS Data Collection Sheet - geocode [Compatibility Mode] - Microsoft Excel

OBS	SITE	LOCATION	TEMPERATURE	LANDCOVER	LATITUDE	LONGITUDE	TIME	SATELLITES	CLOUD TYPE	CLOUD COVER	WeatherBug Temp	WeatherBug MAX	WeatherBug MIN	WeatherBug Precip	Student Name	Team Name
1	Welton Plaza	150 ft E of Boswell	78.1	Trees and Concrete	36.16520	-86.83091	129p	5	Cumulus	5.0	79.8	80.0	60.0	0.0	Dr Padgett	GEOG 3500
2	Floyd Payne	5 ft N or FPCC	85.4	Flowers	36.16653	-86.82703	212p	3	Stratus	5.0	79.8	80.0	60.0	0.0	Imani D	Breadwinners
3	McCord Hall	20 yds N of N McCord	104.0	Grass	36.16579	-86.82932	144p	6	Cumulus	5.0	79.8	80.0	60.0	0.0	Telvin H	Three Nations
4	Amphitheatre	50 ft N of HUM	123.8	Brick	36.16660	-86.83044	155p	7	Cumulus Cirrus	5.0	79.8	80.0	60.0	0.0	Aje F	Green Leaf
5	Torrence Hall	400 ft NW of Hale	119.7	Trees and Concrete	36.16449	-86.83214	153p	6	Cumulus Cirrus	5.0	79.8	80.0	60.0	0.0	Burnell B	Big Blue

Summer 2014 – TSU **Weather & Climate (GEOG 3500)** students worked with PCHS students enrolled in Ms. Yolanda Burrell's 9th grade Physical Sciences course to produce an **"Urban Heat Islands Map"** using ArcGIS Online for **their** MyCOE "Ecological Footprint" project.



Fall 2014 – Tennessee State University and Pearl-Cohn High School Awarded a "Map Your World" Program Grant

http://mapyourworld.org/#/teachers

Map Your World - Nexus 7 Tablet Application

Map it. Track it. Change it. Share it.

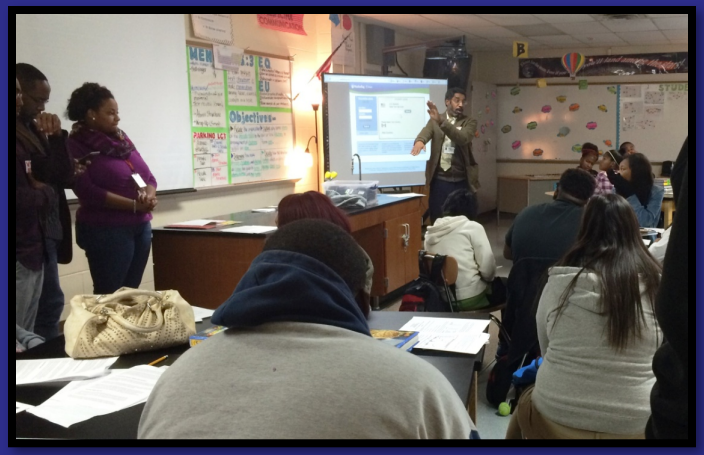
If you work with middle school and/or high school youth and want to incorporate technology into your curriculum, we invite you to participate in an exciting new project – Map Your World – an innovative, multi-platform project that places the power of new technologies into the hands of young change agents.

If your project is selected, you will be awarded five Nexus 7 tablets (valued at $200 each) to support implementing Map Your World in classrooms and/or youth programs. These tablets, in conjunction with the Map Your World platform and curriculum, will assist youth in using data, interactive maps, and storytelling to develop campaigns addressing issues important to the health and well-being of their communities.

To participate, please review this information and complete the application on the next page. We welcome applications from schools, community organizations, after-school programs, and other organizations serving middle and high school students.

Applications must be received no later than Monday, December 1st.

Fall 2014 – Tennessee State University students enrolled in Cartography (GEOG 3100) led Ms. Yolanda Burrell's 9th grade Physical Science class through a mapping exercise using the "Map Your World" platform to address questions related to **"urban heat islands."**



PEARL-COHN HIGH SCHOOL
MAP YOUR WORLD
WWW.MAPYOURWORLD.ORG
INVESTIGATING URBAN HEAT ISLANDS

INSTRUCTORS: MS. YOLANDA BURRELL AND DR. DAVID A. PADGETT

INSTRUCTIONS

Dr. Padgett will begin with a brief introduction to Urban Heat Islands and their impacts upon the environment and human health.

Question: Do measured surface temperatures increase as we move closer to downtown Nashville?

1. Turn on the Nexus 7 Tablet

2. Connect to the PCHS Wifi service

3. Go to the applications screen. Open up the Chrome browser.

4. Go to www.google.com . Search for "WeatherBug Achieve."

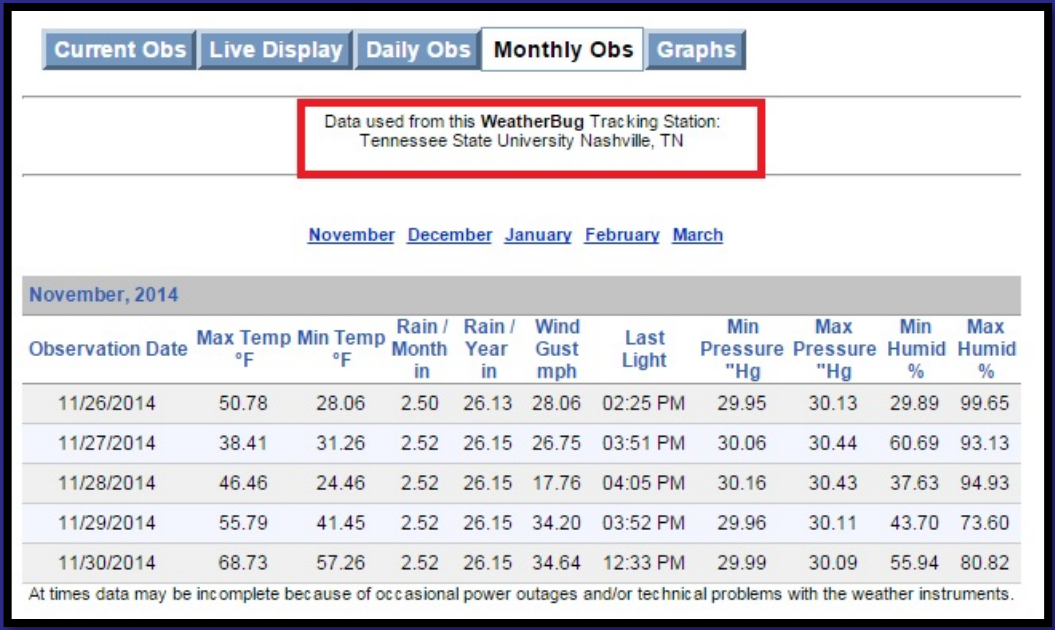
5. Select the WeatherBug Achieve link. Your group will be assigned one of the WeatherBug Stations below. Enter the "WeatherBug Classroom" using the zip code area for your assigned station and then follow the prompts until you get to the station's homepage.

WeatherBug Station	Zip Code Area	Distance from Downtown Nashville (Miles)
Tennessee State University	37209	2.5
Camp Marymount	37062	20.0
Harding Academy	37205	6.3
Crieve Hall ES	37220	7.1
Vanleer ES	37181	37.0
John F Kennedy MS	37013	13.0
Adventure Science Center	37203	1.5

6. Go to the "Pearl-Cohn High School: Investigating Urban Heat Islands" work sheet. Fill in all of the information and data except for the latitude and longitude for your station. Note: Calculate the Average Temperature using the Maximum Temperature and Minimum Temperature.

7. Dr. Padgett will email you the link to the online survey form. Fill it in with the information from your work sheet. Use the form to locate the latitude and longitude for your WeatherBug station. Click Submit.

Fall 2014 – TSU World Regional Geography II (GEOG 1020) and Cartography (GEOG 3100) students assisted ninth grade physical sciences students in entering climate data into the Map Your World data collection form hosted on Google Nexus 7 tablets. Data included maximum and minimum average temperature observations at selected local WeatherBug stations.



Current Obs | Live Display | Daily Obs | Monthly Obs | Graphs

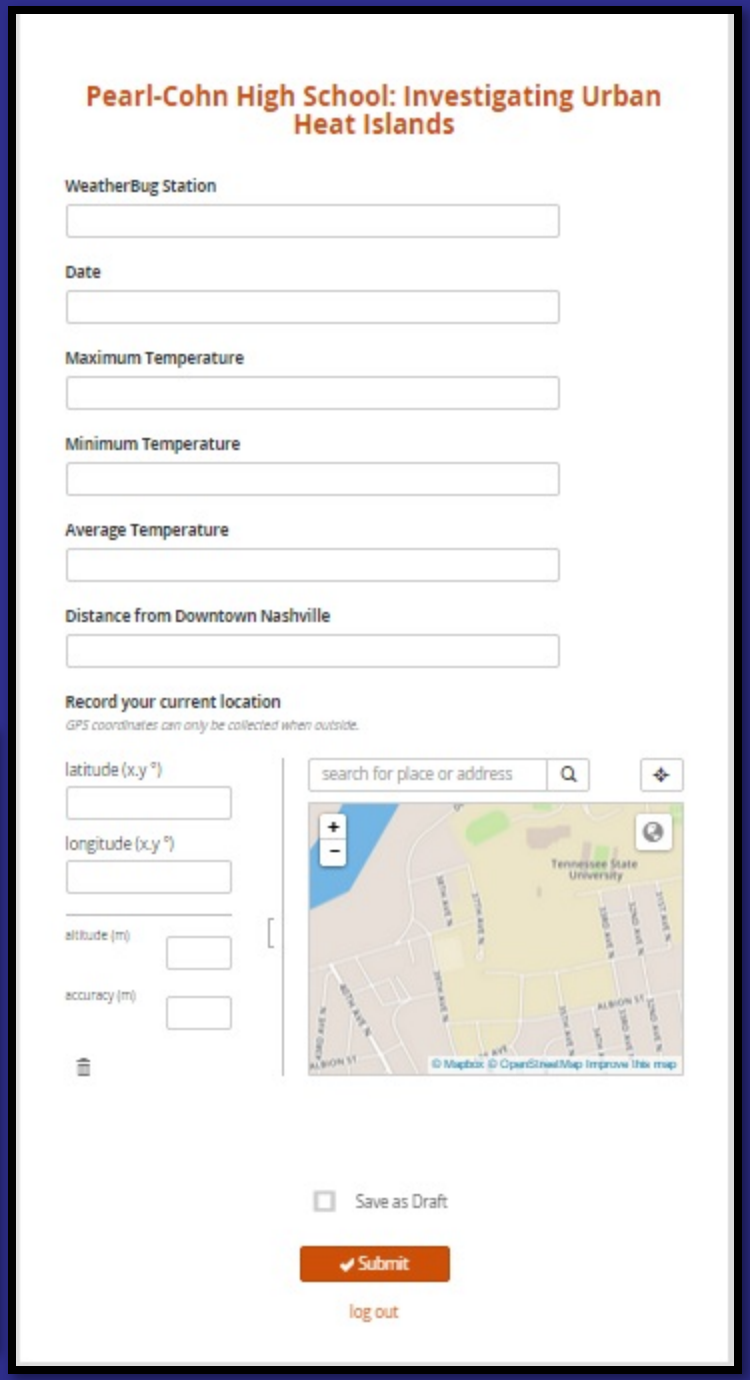
Data used from this **WeatherBug** Tracking Station:
Tennessee State University Nashville, TN

November December January February March

November, 2014

Observation Date	Max Temp °F	Min Temp °F	Rain / Month in	Rain / Year in	Wind Gust mph	Last Light	Min Pressure "Hg	Max Pressure "Hg	Min Humid %	Max Humid %
11/26/2014	50.78	28.06	2.50	26.13	28.06	02:25 PM	29.95	30.13	29.89	99.65
11/27/2014	38.41	31.26	2.52	26.15	26.75	03:51 PM	30.06	30.44	60.69	93.13
11/28/2014	46.46	24.46	2.52	26.15	17.76	04:05 PM	30.16	30.43	37.63	94.93
11/29/2014	55.79	41.45	2.52	26.15	34.20	03:52 PM	29.96	30.11	43.70	73.60
11/30/2014	68.73	57.26	2.52	26.15	34.64	12:33 PM	29.99	30.09	55.94	80.82

At times data may be incomplete because of occasional power outages and/or technical problems with the weather instruments.



Pearl-Cohn High School: Investigating Urban Heat Islands

WeatherBug Station

Date

Maximum Temperature

Minimum Temperature

Average Temperature

Distance from Downtown Nashville

Record your current location

GPS coordinates can only be collected when outside.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)

search for place or address

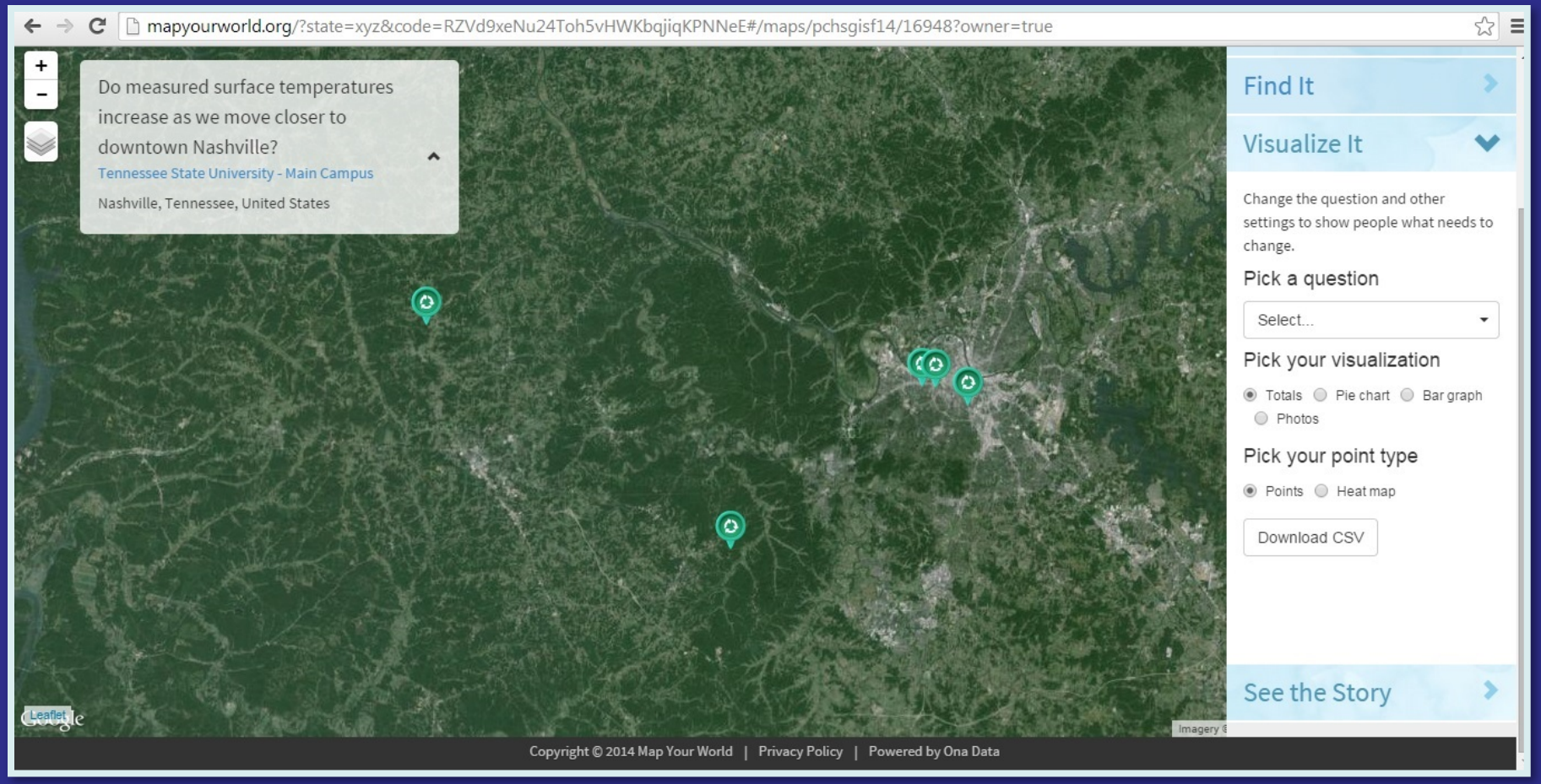
Tennessee State University

Save as Draft

Submit

log out

Fall 2014 – Results of Pearl-Cohn High School students' "urban heat islands" exercise. Regional WeatherBug Station climate data were mapped onto the "Map Your World" program platform. Students analyzed and discussed differences in observed surface temperatures for urban land cover versus green space.

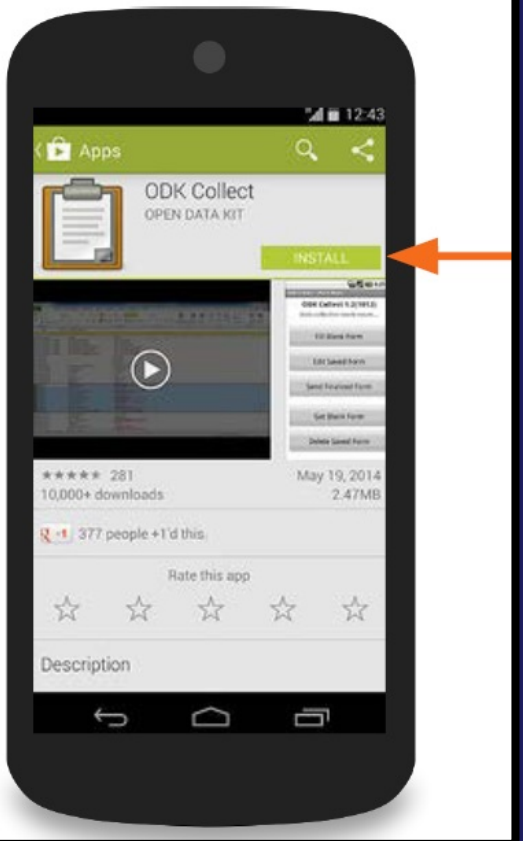


Summer 2015 – TSU Weather & Climate (GEOG 3500) students replicated the Summer 2014 urban heat islands exercise. The "ODK Collect" application replaced pen and paper for entering surface temperature observations attribute data. Data collection point latitude/longitude positions were logged using the Google Nexus 7 tablet GPS function.

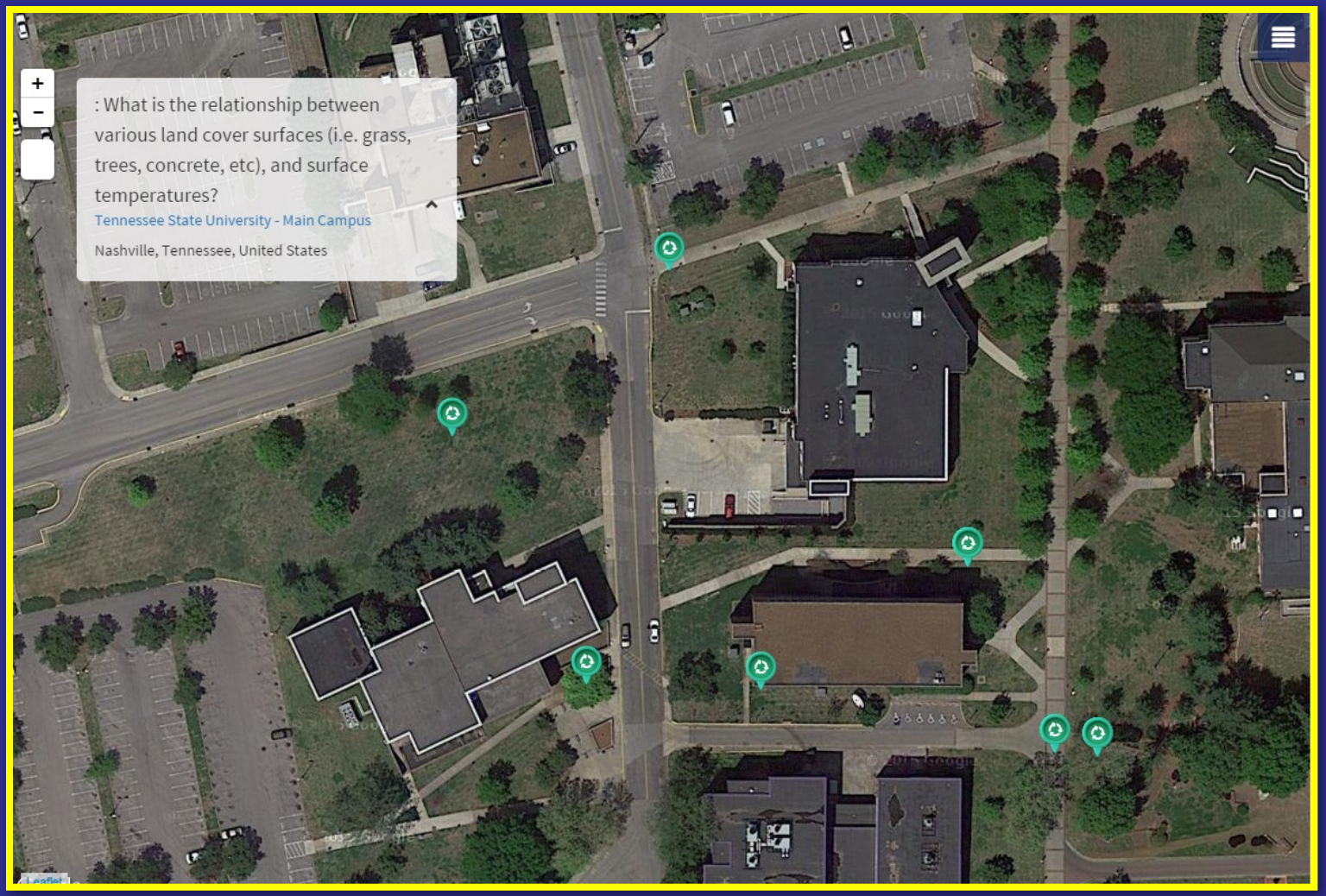
MAP IT: COLLECT DATA

Download ODK Collect to your Android device from Google Play.

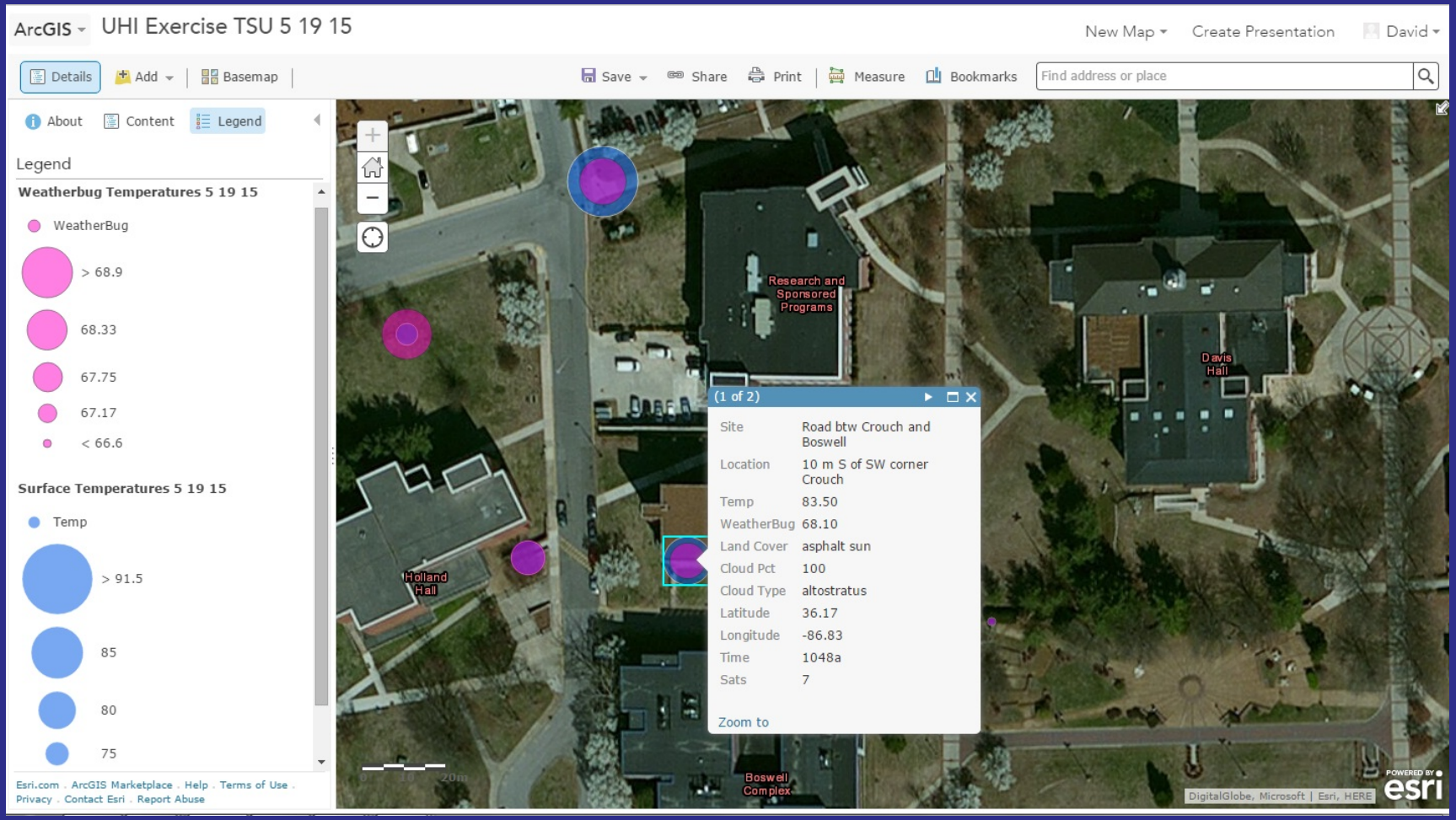
1. Select the Google Play/Android Marketplace icon on your device
2. Search for "ODK Collect" from "Open Data Kit"
3. Select that result and click Install



Summer 2015 – Students in TSU's summer 2015 Weather & Climate course developed a new urban heat islands lesson with the Nexus 7 tablets. The lesson began with surface temperature data collected using infrared thermometers and then data collection points being mapped onto the Map Your World (www.mapyourworld.org) platform.



Summer 2015 – The urban heat islands lesson concludes with surface temperature data collected using the Nexus 7 tablet being downloaded from the Map Your World map in comma delimited text (CSV) format and then imported into the ArcGIS Online platform. Using ArcGIS, surface temperatures are compared with ambient air temperature data collected from TSU's Weatherbug Station (http://weather.weatherbug.com/).



Summer 2016 – Summer 2020 – Mission Earth Project

The TSU Mission Earth project focuses upon the implementation of the GLOBE Program Atmosphere and Weatherbug Protocols with partner high schools. The work in place at Stratford and Pearl-Cohn will be expanded to include Maplewood HS and Whites Creek HS. The target population is students who are underrepresented in the STEM and geoscience disciplines. In Dr. David A. Padgett's capacity as the TSU GLOBE Point of Contact, he will certify teachers from each school in the GLOBE Atmosphere and WeatherBug Protocols. **Thus, four new GLOBE high schools will be established.**

Mission Earth: Fusing GLOBE with NASA Assets to Build Systemic Innovation in STEM Education

GLOBE, UT, BU, WestEd, UCB, TSU, Raytheon, NASA LaRC, JPL

Mission Earth

Fusing GLOBE with NASA Assets to Build Systemic Innovation in STEM Education

Principal Investigator: Kevin Czajkowski, University of Toledo, 2801 W Bancroft St, UH 4580, MS 932, Toledo, OH 43606-3328

Co-Investigators: Glenn Lipscomb[1], Mark Templin[1], Peter Garik[2], Bruce Anderson[2], Magaly Koch[2], Svetlana Darche[3], Matt Silberglitt[3], Ronald Cohen[4], David Padgett[5], Jessica Taylor[6], David Overoye[7]

[1]University of Toledo, [2]Boston University, [3]WestEd, [4]UCBerkley, [5]Tennessee State University, [6]NASA Langley Research Center, [7]Raytheon

Proposal Submitted in Response to: Announcement NNH15ZDA004C - NASA Science Mission Directorate Science Education Cooperative Agreement Notice (CAN)

Fall 2016 – Pre-Service teachers enrolled in sections of lower-level World Regional Geography (GEOG 1010) are certified in the GLOBE Atmosphere Protocols through a series of exercises.

GEOG 1020 GLOBE Atmosphere Protocol Certification Assignment

October 5-17, 2016

1.) GLOBE group Power Point™ presentation. Monday, October 10.

2.) First draft of GLOBE term paper. Due Monday, October 17. Each group must complete ONE draft of the term paper. Additional instructions will be provided during class. Please upload copies of the draft term paper to EACH GLOBE Group member's drop box.

3.) GLOBE Atmosphere Protocol eTraining. Each INDIVIDUAL student must make satisfactory progress in completing his/her GLOBE Atmosphere Protocol training. Additional instructions will be provided during class. https://www.globe.gov/get-trained/protocol-etraining/etraining-modules/0/0/requirements

4.) Stratford High School Urban Heat Islands Exercise – Thursday, October 13 – 12:45 – 2:00 pm. Transportation will be provided. We will be working with 9th grade students at Stratford High School, guiding them through the "Urban Heat Islands Exercise" and the GLOBE Atmosphere Protocols, including the Surface Temperature Protocol. Please indicate whether you will be able to attend.

Fall 2016 – Exercise using GLOBE data assigned to pre-service teachers enrolled in sections of lower-level World Regional Geography (GEOG 1010).

Rainfall in the GLOBE Africa Region: A GLOBE Data Exploration

Purpose

Through explorations of GLOBE rain depth data from Africa, students learn about seasonal patterns in locations affected by monsoons.

Overview

Students analyze GLOBE precipitation data from schools in three countries in Africa as a way of observing monsoon cycles. They learn why monsoons happen and then apply what they have learned to predict which other areas of the world would be affected by monsoon rainfall.

Student Outcomes

Students will be able to:

Science Practices

- *Asking questions*
- *Analyzing and interpreting data*
- *Constructing explanations*
- *Obtaining, evaluating, and communicating information*

Time

Two class periods (80-100 minutes)

Level

Middle and high school (grades 6-12)

Materials and Tools

For the computer-based activity:

- Computers with access to Microsoft Excel or Google Sheets

Fall 2016 – Pre-service teachers enrolled in sections of lower-level World Regional Geography (GEOG 1010) are required to work with high school students at Stratford STEM Magnet High School as part of their GLOBE training.

Surface Temperature Protocol

Purpose

To measure surface temperature.

Overview

Surface temperature is measured with a hand-held Infrared Thermometer (IRT) that, when necessary, is wrapped in a thermal glove or has been placed outdoors for at least 30 minutes prior to data collection. The instrument is pointed at the ground to take surface temperature readings. *Cloud Protocols* are performed along with the *Surface Temperature Protocol*.

Life Sciences

Sunlight is the major source of energy for ecosystems.

Energy for life derives mainly from the Sun.

General Science

Visual models help us to analyze and interpret data.

Geography

The temperature variability of a location affects the characteristics of Earth's physical geographic system.

The nature and extent of cloud cover affects the characteristics of Earth's physical geographic system.

Level

All

Frequency

Daily with other atmosphere measurements

On sunny days with few clouds for comparison with satellite observations.

When taking soil temperature measurements

When *Land Cover Sample Sites* are visited

Materials and Tools

Hand-held Infrared Thermometer (IRT)

Thermal Glove (use when the air temperature at the study site varies more than 5 degrees Celsius from the air temperature of where the IRT has been stored.)

Surface Temperature Data Sheet

GLOBE Cloud Chart

Ruler or meter stick

Watch

Pen or pencil

Preparation

Establish an Atmosphere Study Site OR

Establish a site where soil temperature is measured OR

Prepare to characterize Land Cover Sample Sites

Prerequisites

None

Surface Temperature Protocol

Field Guide

Task

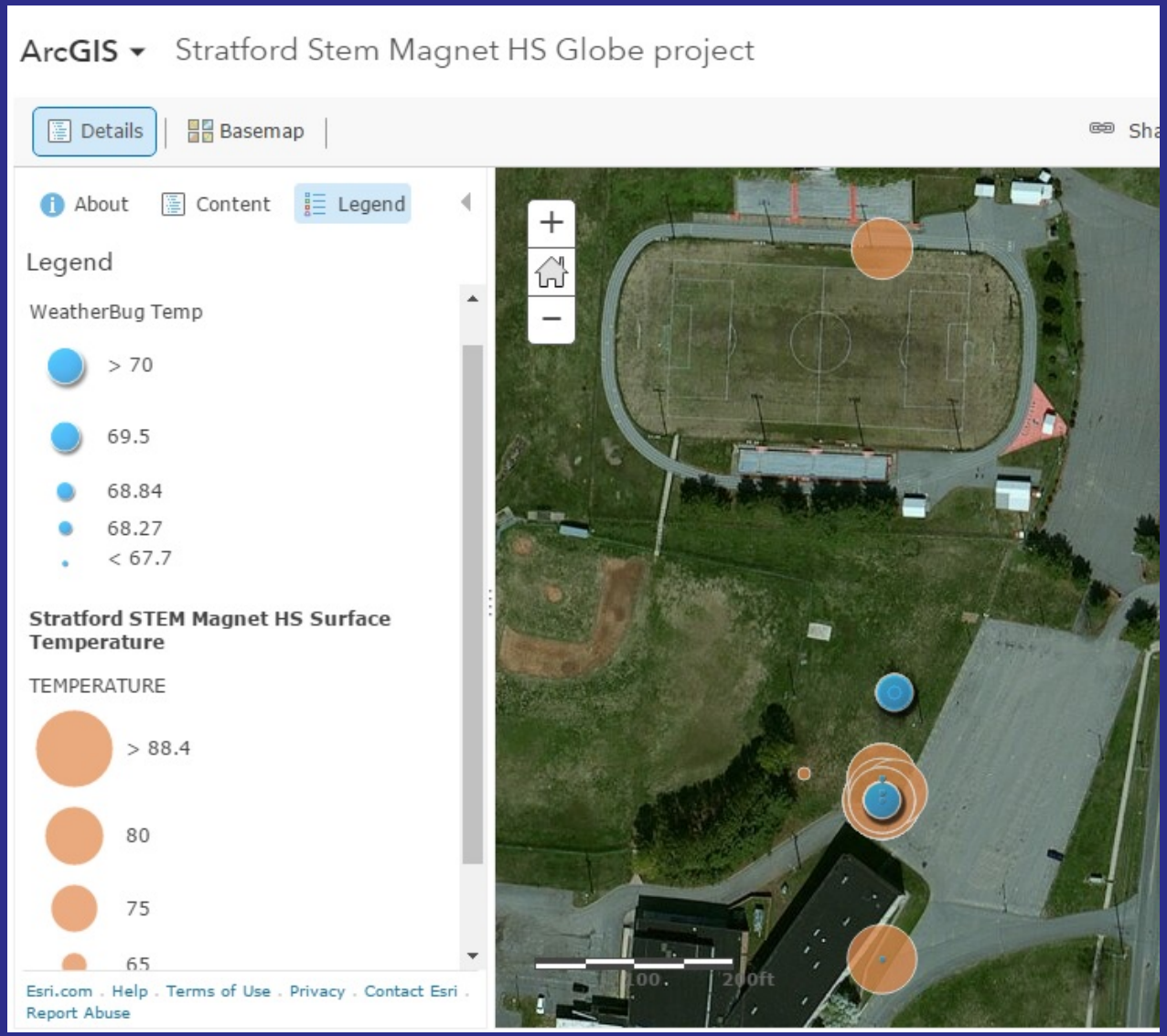
Measure surface temperature.

What You Need

- ❑ *Surface Temperature Data Sheet*
- ❑ Hand-held Infrared Thermometer (IRT)
- ❑ Thermal Glove (use when the air temperature at the study site varies more than 5 degrees Celsius from the air temperature of where the IRT has been stored.)
- ❑ Ruler or Meter Stick, (if snow cover is present)
- ❑ Pencil or pen
- ❑ GLOBE Cloud Chart
- ❑ Accurate watch

Fall 2016 – Spring 2017 – TSU pre-service teachers lead Rodney Donaldson's Stratford STEM Magnet HS students in GLOBE Surface Temperature Protocol exercise as part of their Certification process. Approximately 10 pre-service teachers were certified in The GLOBE Atmosphere Protocols.

Fall 2016 – Spring 2017 – Pre-service teachers map results of Stratford STEM Magnet HS GLOBE Surface Temperature Protocol exercise using ArcGIS online.



Spring 2017 – Urban Geography (GEOG 4850) students "Community GIS Group Term Paper Project" - "Citizen Science" Criteria Air Pollutant Sampling and Mapping at Cayce Homes in partnership with Health Impacts of Degraded Environments (HIDE), Inc.

Criteria Air Pollutants -- Ozone, Carbon Monoxide, Particulate Matter, Lead, Sulfur Dioxide, Nitrogen Dioxide

TSU students led a "citizen science" air sampling and mapping protocol in cooperation with local public housing community residents.

HIDE
HEALTH IMPACTS OF DEGRADED ENVIRONMENTS

Fall 2017 – Pre-service teachers enrolled in World Regional Geography (GEOG 1020) sections collect ambient and surface air temperature data before, during and after the August 21 solar eclipse event.

Kids using certified eclipse glasses. (Credit: Rainbow Symphony)

SOLAR ECLIPSE 2017

LINKS AND RESOURCES

Courtesy of: GLOBE Mission EARTH

Wherever you are in North America on August 21st, 2017 (whether in the path of totality or outside of it), YOU can help NASA by collecting GLOBE data before and after the eclipse, even if it's cloudy! Use the links and resources below for ideas on possible lesson plans, activities and additional information.

LINKS AND RESOURCES

Website/Resource	Details
GLOBE's Eyes on the Great American Eclipse: https://www.globe.gov/web/eclipse/overview	This is GLOBE's go-to page for all things 2017 Solar Eclipse. Includes research ideas, learning activities, demos & more.
Download the GLOBE Observer App at: http://observer.globe.gov/	Use this app to quickly and easily collect clouds data for GLOBE, during the eclipse and at any other time!
NASA Total Eclipse EDUCATION Website: https://eclipse2017.nasa.gov/education	Click on the K-12 link, and you will find links to activities for elementary, middle and high school levels.
National Solar Observatory's Educator Page: http://eclipse2017.nso.edu/educators/	Scroll down for a wide variety of resources. Ex. check out the animation called "Shadow moving across the USA".
NSTA's Solar Science Observer's Guide: http://static.nsta.org/extras/solarscience/SolarScienceInsert.pdf	This is an 8-page color, printable guide on the basics of what a solar eclipse is, how to safely observe it, and information specific to the August 21st, 2017 eclipse.
PBS Teach about the 2017 Solar Eclipse:	Check out the *Teacher Toolkit*, and all of the other

Fall 2017 – Pre-service teachers enrolled in World Regional Geography (GEOG 1020) sections collect ambient and surface air temperatures before, during and after the August 21 solar eclipse event.

Eclipse 2017 Atmospheric Data Collection Work Sheet

Name of Person Collecting Data _____ Email _____ Date_____

School Campus Covered _____ Team Name _____

Datum _____ GPS Unit Serial Number _____

GPS Unit Name Brand and Model _____

Location	Thermometer Temp (°C)	Surface Temp - IRT (°F)	Land cover Description (sun or shade/ surface)	Latitude	Longitude	Cloud Cover (%)	Cloud Type(s)	Time	Sats	Log #

Fall 2017 – Pre-service teachers enrolled in World Regional Geography (GEOG 1020) sections collect ambient and surface air temperatures before, during, and after the August 21 solar eclipse event.

2017 PROJECT GOALS and ACCOMPLISHMENTS

JANUARY-MAY: RECRUIT TEACHERS FROM THE OTHER THREE PARTNER SCHOOLS

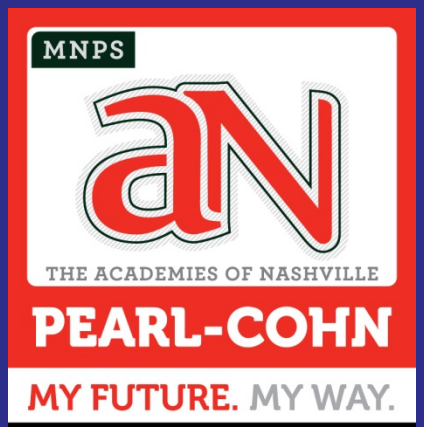
JANUARY-MAY: INSTALL WEATHERBUG WEATHER STATIONS

MARCH 2017: GLOBE WORKSHOP AT THE HBCU CLIMATE CHANGE CONFERENCE, INCLUDING PRESENTATIONS BY CERTIFIED PRE-SERVICE TEACHERS

APRIL 2017: GLOBE STUDENT SCIENCE FAIR – HUNTSVILLE, AL

MAY-AUGUST: PROFESSIONAL DEVELOPMENT -- CERTIFY IN-SERVICE TEACHERS IN THE GLOBE ATMOSPHERE PROTOCOLS

AUGUST-DECEMBER: FULL IMPLEMENTATION OF GLOBE ATMOSPHERE PROTOCOLS AT FOUR PARTNER HIGH SCHOOLS WITH EVALUATION



Fall 2017 – Spring 2021 - GLOBE Mission Earth Project – Tennessee State University site - pre-service teacher certification model.

Assignment 1 – Introductory Group Power Point Presentation.

WORLD REGIONAL GEOGRAPHY 1010

Global Learning and Observations to Benefit the Environment (GLOBE)
(www.globe.gov)

Introductory Group Power Point Presentation

1.) Students planning to be teachers/educators will be assigned to groups within which they will complete the GLOBE Atmosphere Protocol Group Term Paper Project (see the syllabus).

2.) Each group member must "Join" GLOBE and create a "pre-service" teacher account. Each group member must upload a screen capture of his/her account confirmation page to the designated drop box.

Fall 2017 – Spring 2021 - GLOBE Mission Earth Project – Tennessee State University site - pre-service teacher certification model.

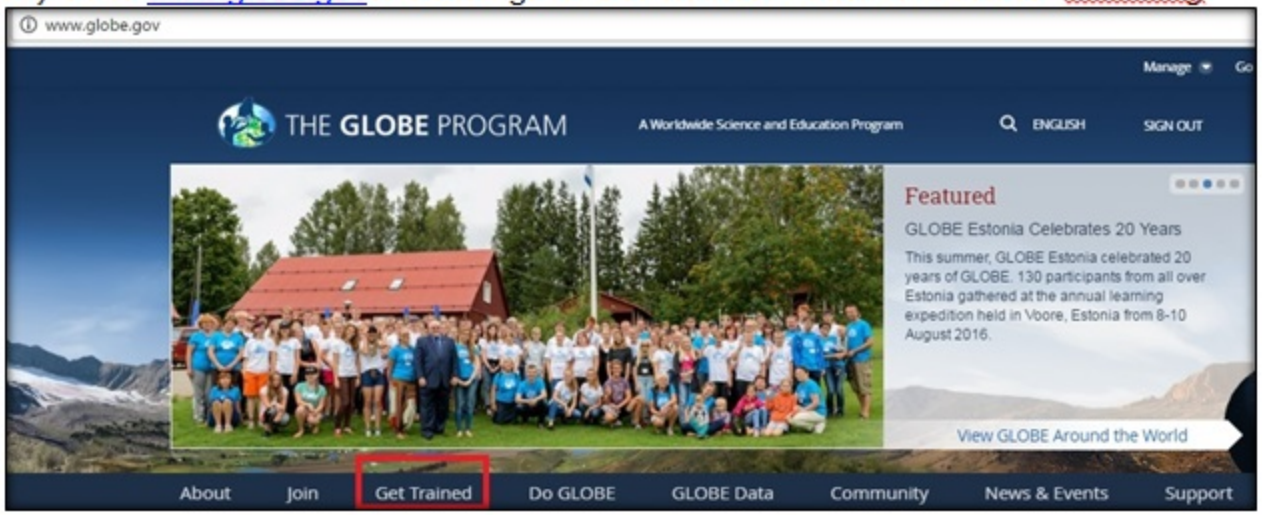
Assignment 2 – GLOBE Surface Temperature Protocol Data Entry

GLOBE Surface Temperature Protocol Data Entry Assignment

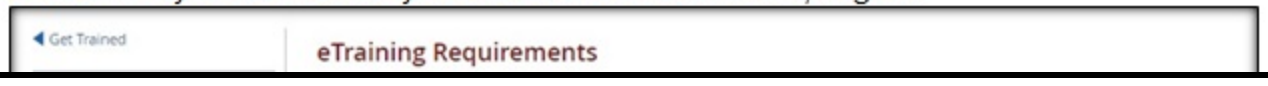
Pre-service teachers are assigned the task of entering the Surface Temperature Protocol data we collected outdoors into the GLOBE www.globe.gov website. Data Entry is perhaps the most important element of the GLOBE program. You will lead your students in entering the data they collect so that it may be shared globally.

Instructions (Complete Steps 1-15)

1.) Go to www.globe.gov and then go to "Get Trained." Click on "Protocol eTraining."



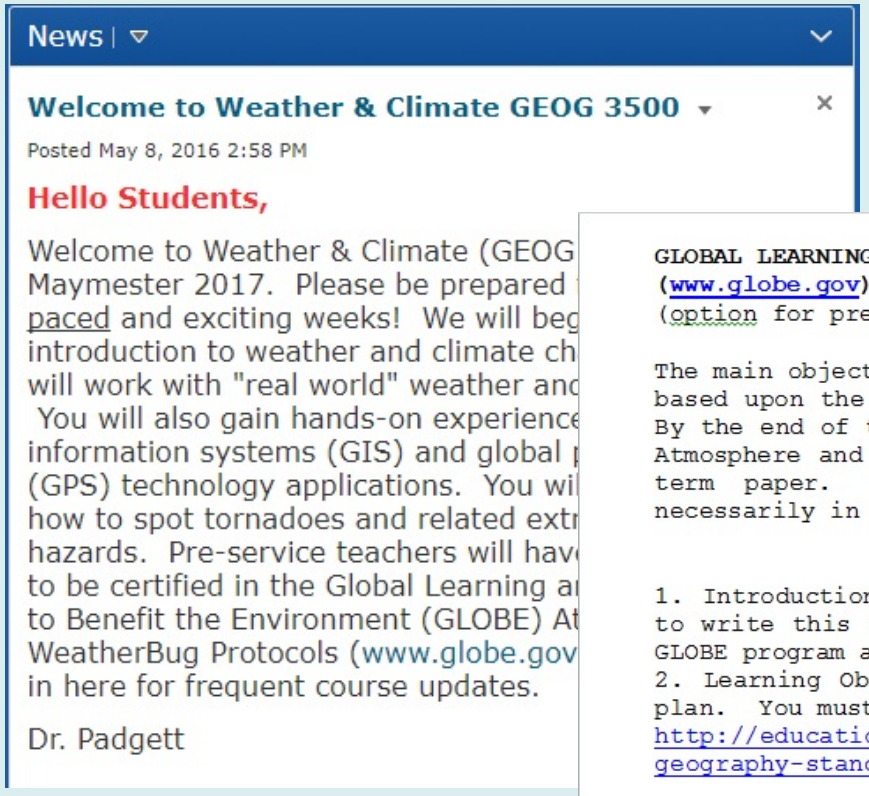
2.) Click on "eTraining Requirements" and then follow the steps to Create a GLOBE account. If you have already created a GLOBE account, Log-in.



Fall 2017 – Spring 2021 - GLOBE Mission Earth Project – Tennessee State University site - pre-service teacher certification model.

Assignment 3 – Lead partner high school students in GLOBE Surface Temperature Protocol data collection and GIS mapping exercise.

Summer 2018 – Summer 2021 – Pre-Service teachers successfully earning GLOBE certification are encouraged to take Weather and Climate (GEOG 3500) where they will gain more in-depth exposure to atmospheric science.



News

Welcome to Weather & Climate GEOG 3500

Posted May 8, 2016 2:58 PM

Hello Students,

Welcome to Weather & Climate (GEOG
Maymester 2017. Please be prepared
paced and exciting weeks! We will beg
introduction to weather and climate ch
will work with "real world" weather and
You will also gain hands-on experience
information systems (GIS) and global
(GPS) technology applications. You wi
how to spot tornadoes and related extr
hazards. Pre-service teachers will hav
to be certified in the Global Learning a
to Benefit the Environment (GLOBE) At
WeatherBug Protocols (www.globe.gov
in here for frequent course updates.

Dr. Padgett

GLOBAL LEARNING AND OBSERVATIONS TO BENEFIT THE ENVIRONMENT (GLOBE) (www.globe.gov) ATMOSPHERE PROTOCOL GROUP TERM PAPER PROJECT
(option for pre-service teachers ONLY)

The main objective of the paper is the development of a complete lesson plan based upon the GLOBE Atmosphere and WeatherBug Protocols for k-12 students. By the end of the course, you will be eligible to be certified in the GLOBE Atmosphere and WeatherBug Protocols in part based upon the quality of your term paper. The paper must include the following components, not necessarily in this order:

1. Introduction/Summary - Summarize the entire paper here. You might want to write this section last. You must include a general description of the GLOBE program and a specific description of the Atmosphere Protocol.
2. Learning Objectives - List the main learning objectives of your lesson plan. You must make reference to at least four National Geography Standards http://education.nationalgeographic.com/education/standards/national-geography-standards/?ar_a=1.

3. Critical Components - Time/Duration, Age Group, Grade Level, Skill Level, etc.
4. Materials Required
5. Methods - Describe in detail how the lesson will be taught.
6. Expected Learning Outcomes
7. Evaluation - Describe how you will grade/evaluate the students in order to determine if they've met your expected learning outcomes.
8. Discussion - Discuss the strengths and weaknesses of GLOBE as applied to classroom teaching in general and this lesson in particular. What could possibly go wrong? How could it be improved? What recommendations do you

Summer 2018 – Summer 2021 - Weather and Climate (GEOG 3500) students will participate in “citizen science” air quality investigations. They will compare criteria air pollutant sampling results with GLOBE Aerosol Protocol findings

Instruments for measuring Aerosol Optical Thickness

GLOBE sunphotometer

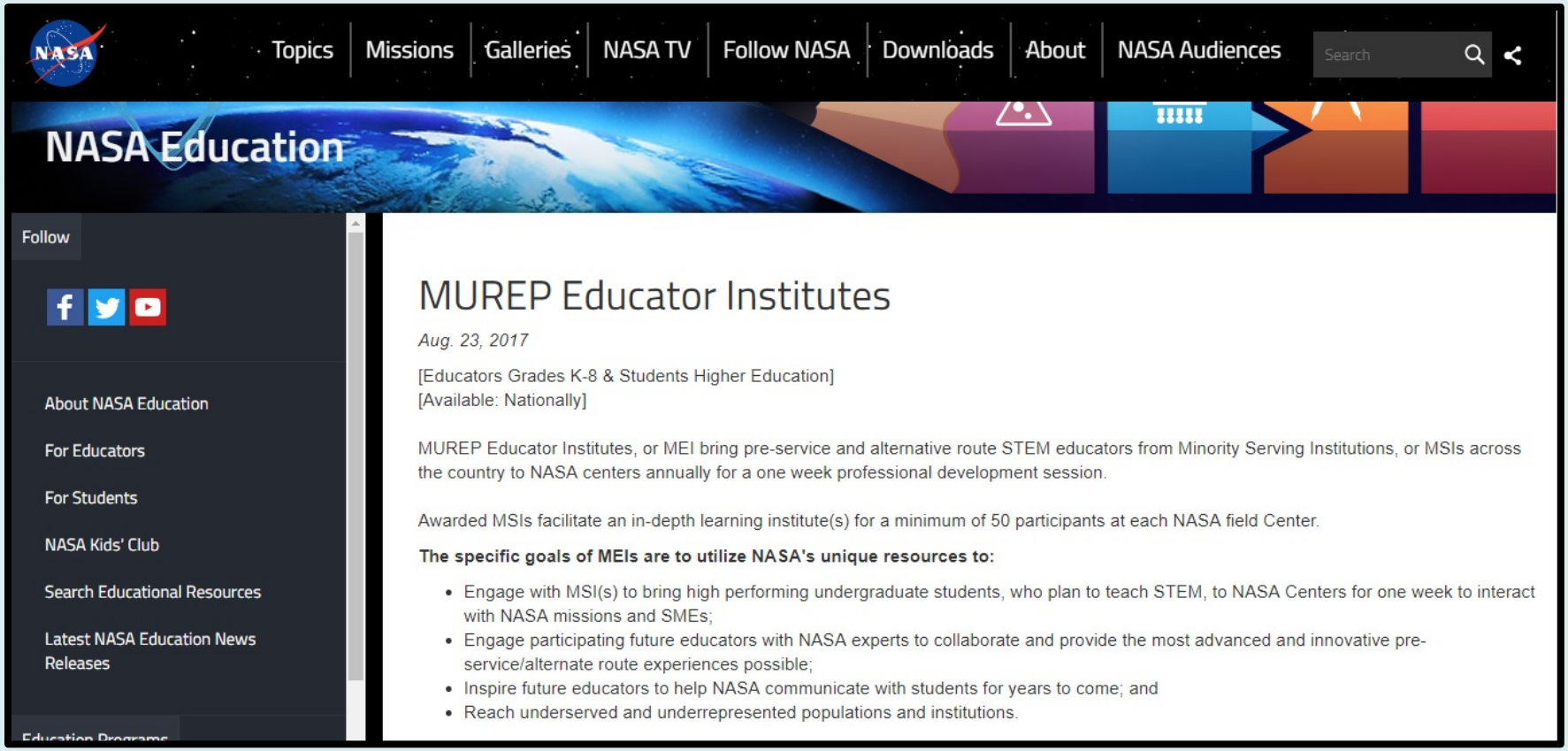
Students point a sun photometer at the sun, measure at the red and green and always record the largest voltage reading they obtain on a digital voltmeter connected to the photometer. Pointing to the sun is done manually. The values of AOT will be calculated automatically when entering data through GLOBE data entry page.

For instructions how to measure with GLOBE sun photometer and how the AOT is calculated read the GLOBE Aerosols Protocol and Field Guide.

Order GLOBE sunphotometer from David Brooks, Institute for Earth Science Research and Education.

http://www.instesre.org/Aerosols/order_form.htm

Summer 2018 – Summer 2021 – Pre-Service teachers successfully earning GLOBE certification will be encouraged to work with College of Education faculty in the NASA Minority Undergraduate Research Experience Program (MUREP) Educator Institutes.



Summer 2018 – Summer 2021 – Ideally, pre-service teachers successfully earning GLOBE certification will be hired by one of our partner high schools and continue to work with the project, as was the case with Rodney Donaldson, below, right. Rodney is a teacher at Stratford STEM Magnet High School and is the Lead GLOBE teacher at the TSU Mission Earth Site. He was GLOBE certified in the Atmosphere Protocols while enrolled in Weather & Climate (GEOG 3500).

MNPS

aN

THE ACADEMIES OF NASHVILLE

STRATFORD

MY FUTURE. MY WAY.

Mapping Resources

Association of American Geographers (AAG) My Community, Our Earth Program (www.mycoe.org)

Map Your World Program (www.mapyourworld.org)

Environmental Systems Research Institute (ESRI) ConnectED Program (http://connected.esri.com/)

ESRI ArcGIS Online (www.arcgis.com)

Global Learning and Observations to Benefit the Environment (GLOBE) (http://www.globe.gov)

ESRI Story Maps (http://storymaps.arcgis.com/en/)

THANK YOU!
For your time and attention.

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NASA

MISSION EARTH

The GLOBE Program

QUESTIONS?

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