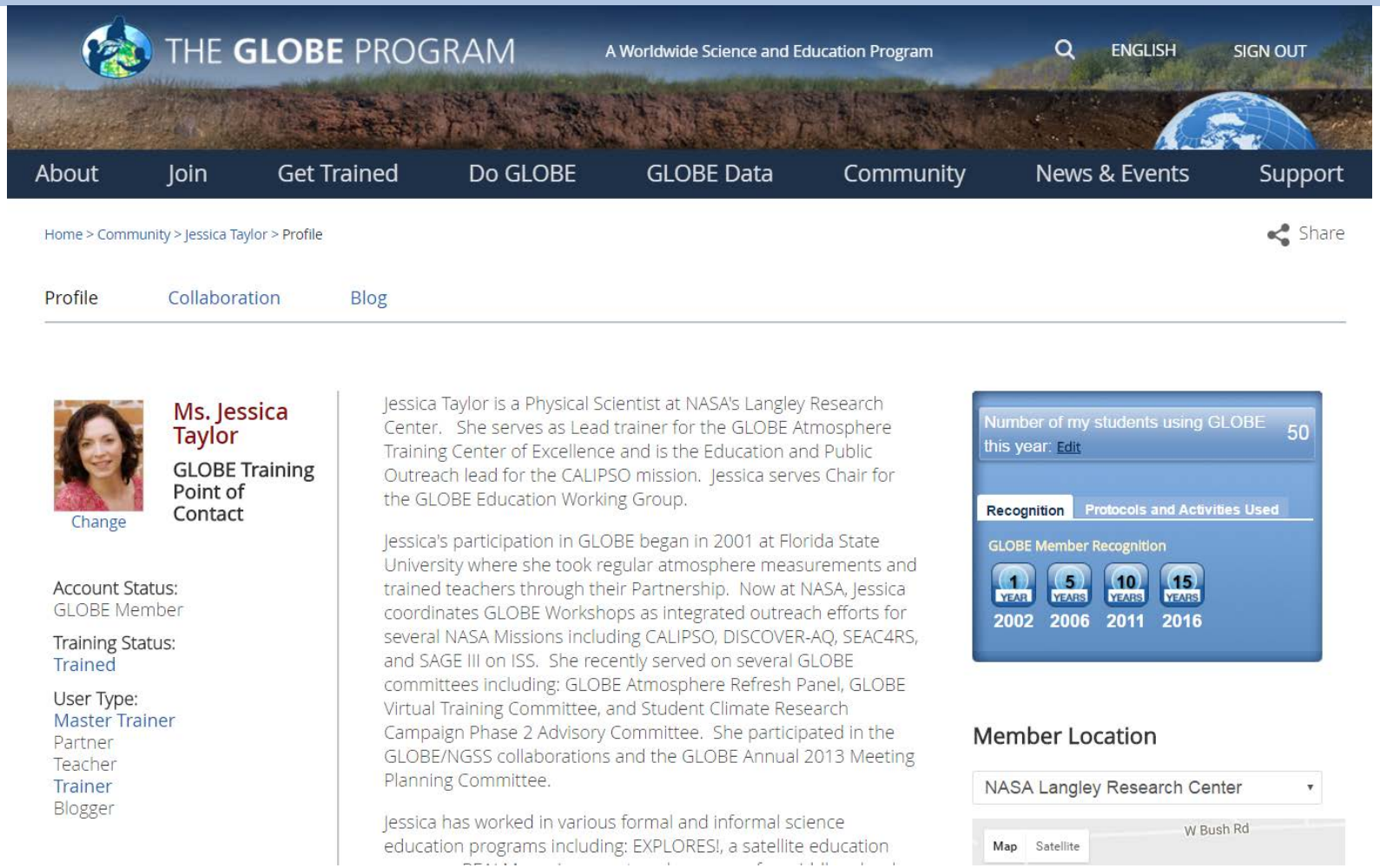
GLOBE ECSU Hybrid Training



With GLOBE Maser Trainer, Jessica Taylor from NASA Langley

Jessica.e.taylor@nasa.gov

help@globe.gov

Pre-requisite Online Materials

K-5 Teachers	6-8 Teachers	9-12 Teachers	Pre-Service Teachers (ECSU Students)
Register for GLOBE Workshop and Create GLOBE Teacher Account at: https://www.globe.gov/get-trained/workshops	Register for GLOBE Workshop and Create GLOBE Teacher Account at: https://www.globe.gov/get-trained/workshops	Register for GLOBE Workshop and Create GLOBE Teacher Account at: https://www.globe.gov/get-trained/workshops	Register for GLOBE Workshop and Create GLOBE Teacher Account at: https://www.globe.gov/get-trained/workshops
Conduct online GLOBE eTraining at: http://www.globe.gov/get-trained/protocol-etraining	Conduct online GLOBE eTraining at: http://www.globe.gov/get-trained/protocol-etraining	Conduct online GLOBE eTraining at: http://www.globe.gov/get-trained/protocol-etraining	Conduct online GLOBE eTraining at: http://www.globe.gov/get-trained/protocol-etraining
• **Introduction to GLOBE**	• Introduction to GLOBE	• Introduction to GLOBE	• Introduction to GLOBE
• **Introduction to Atmosphere**	• Introduction to Atmosphere	• Introduction to Atmosphere	• Introduction to Atmosphere
• **Clouds**	• Clouds	• Clouds	• Clouds
• **Surface Temperature**	• Surface Temperature	• Surface Temperature	• Surface Temperature
Review Elementary GLOBE Teacher Implementation Guide: http://www.globe.gov/documents/348830/348842/ElementaryGLOBE_ImplementationGuide_en.pdf	• Air Temperature	• Air Temperature	• Air Temperature
Read Elementary GLOBE Aerosols Storybook: http://www.globe.gov/web/elementary-globe/overview/aerosols/story-book	Read Dr. C's latest blog post on Urban Heat Islands and his Surface Temperature Measurement Campaign: http://bit.ly/2hnbLOs	Read Dr. C's latest blog post on Urban Heat Islands and his Surface Temperature Measurement Campaign: http://bit.ly/2hnbLOs	Read Elementary GLOBE Aerosols Storybook: http://www.globe.gov/web/elementary-globe/overview/aerosols/story-book
Review Elementary GLOBE Aerosols Learning Activities: http://www.globe.gov/web/elementary-globe/overview/aerosols/learning-activities	Watch Recorded Webinar on Field Investigations, helping students and teachers prepare for the GLOBE Science Symposium: https://www.globe.gov/web/united-states-of-america/events/eventsdetail/14718/teacher-pd-webinar-conducting-field-investigatio-1	Watch Recorded Webinar on Field Investigations, helping students and teachers prepare for the GLOBE Science Symposium: https://www.globe.gov/web/united-states-of-america/events/eventsdetail/14718/teacher-pd-webinar-conducting-field-investigatio-1	Watch Recorded Webinar on Field Investigations, helping students and teachers prepare for the GLOBE Science Symposium: https://www.globe.gov/web/united-states-of-america/events/eventsdetail/14718/teacher-pd-webinar-conducting-field-investigatio-1

Agenda ECSU F2F Training

9:00
Welcome
Microclimates Activity
10:00
Watch SAGE Launch, live
GLOBE Student Research Process
Observations, Questions, Protocols
11:00
Instrument Shelter Set-Up
Review Air Temperature
Calibrating your Thermometer
11:30 Lunch

12:00
Review Surface Temperature
Review Clouds – Cloud Triangle
Outside Data Collection (Paper Data Sheets, Apps)
Review and Analyze our Data
Enter Data on GLOBE site
1:00
Learning Activity – *Earth System Satellite Images*
Discuss GLOBE across grade bands
Wrap – up and Certificates

Saturday, February 18, 2017

Welcome & Introductions

Please share

- Your name
- Your school – grade you teach or what you want to teach
- 1 thing you learned from online materials
- 1 thing you have questions about, or want to know more about

Global Learning and Observations to Benefit the Environment

Vision:

- *A worldwide community of students, teachers, scientists, and citizens working together to better understand, sustain, and improve Earth's environment at local, regional, and global scales.*

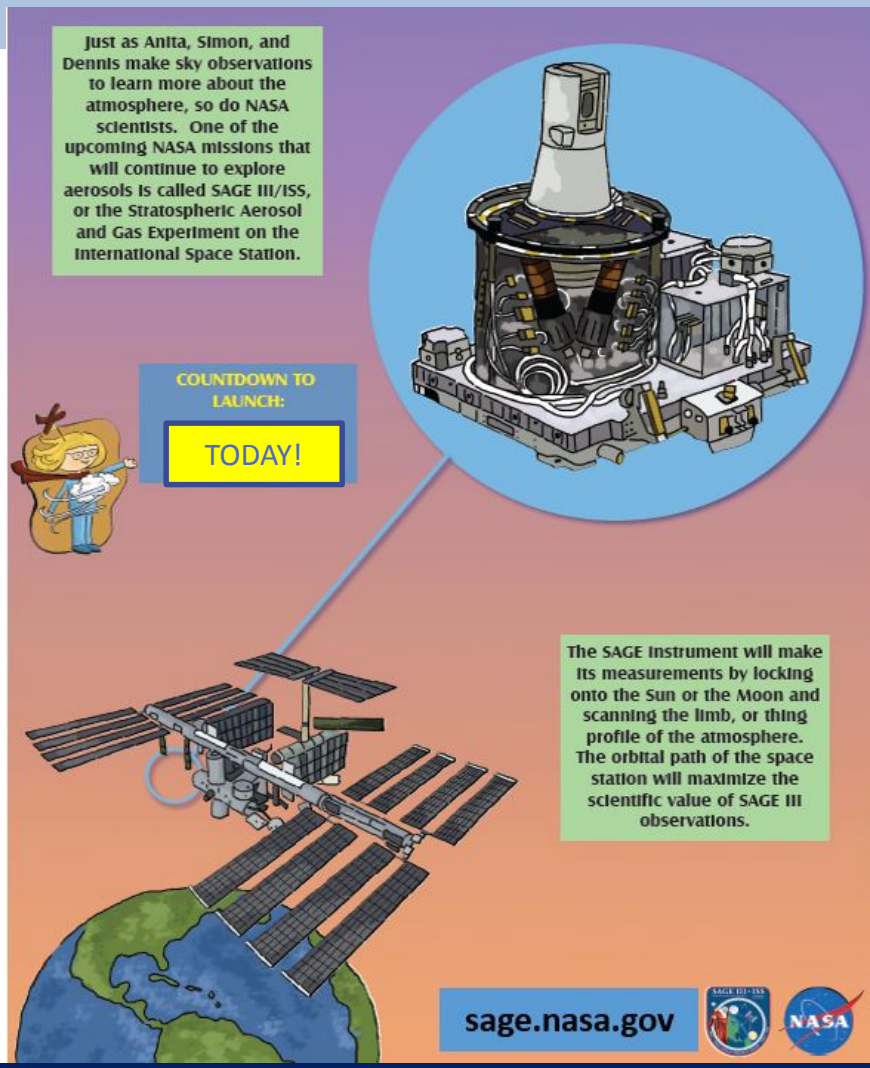
Mission:

- *To promote the teaching and learning of science, enhance environmental literacy and stewardship, and promote scientific discovery.*




Timeout for: SAGE Launch!

- View Launch Live on NASA TV: https://www.nasa.gov/multimedia/nasatv/index.html#public



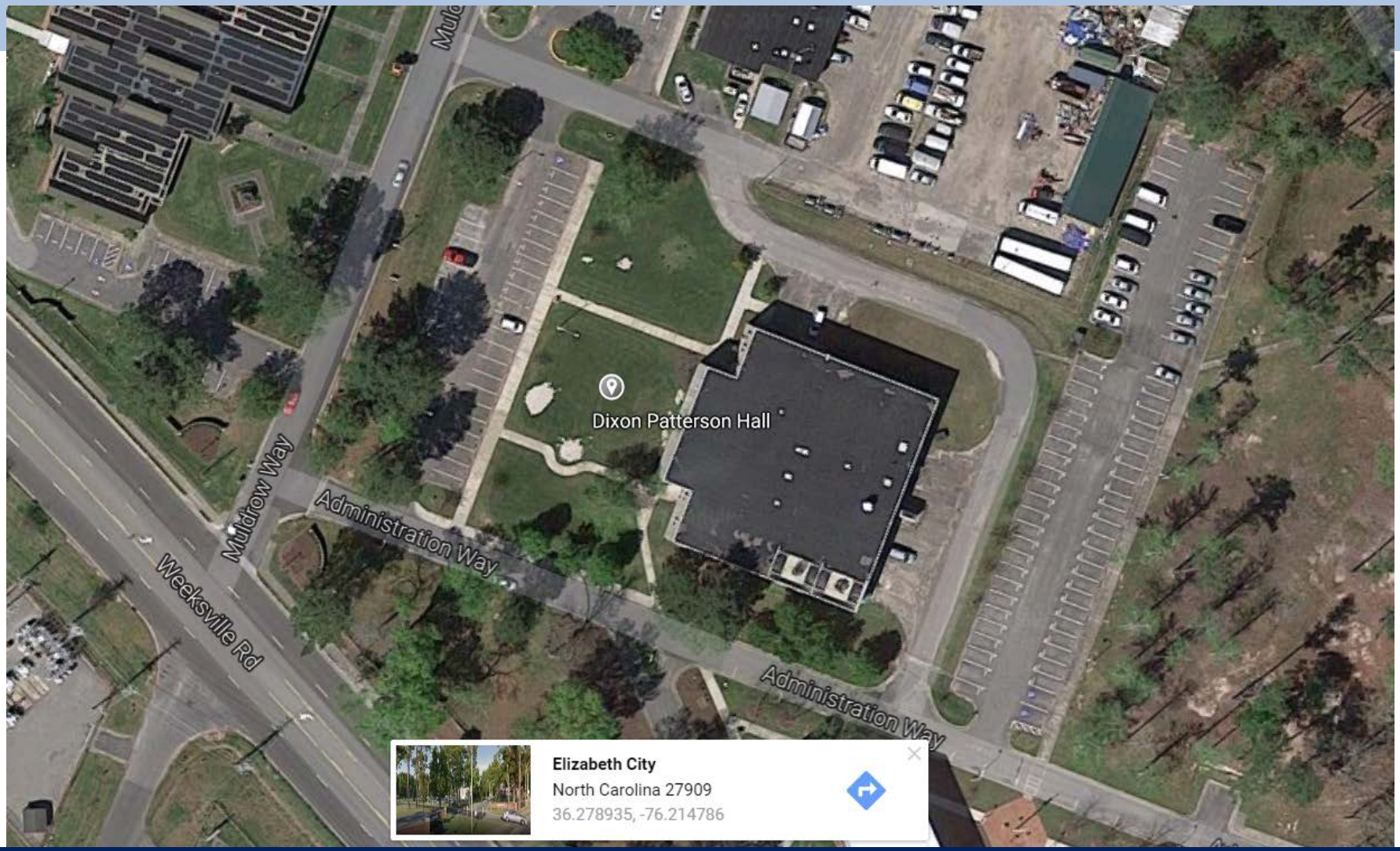
https://www.globe.gov/c/blogs/find_entry?entryId=23154545

Microclimates Activity

- A microclimate is a local atmospheric zone where the climate differs from the surrounding area. The term may refer to areas as small as a few square meters (for example a garden bed) or as large as many square kilometers (for example a small town).
- Microclimates exist, for example, near bodies of water which may cool the local atmosphere, or in heavily urban areas where brick, concrete, and asphalt absorb the sun's energy, heat up, and re-radiate that heat to the ambient air; the resulting urban heat island is a kind of microclimate.
- Another contributing factor to a microclimate is the slope or aspect of an area. South-facing slopes in the Northern Hemisphere and north-facing slopes in the Southern Hemisphere are exposed to more direct sunlight than opposite slopes and are therefore warmer for longer periods of time.
- Some cities or large areas are renowned for their microclimates and may have a wide range of extremes of temperature due to the influence of physical factors.

From GLOBE's What is Your Climate Classification Climate Foundations Activity
http://classic.globe.gov/fsl/pdf/2011/What_Is_Your_Climate_Classification.pdf

Task 1: Sketch Grounds



From GLOBE's What is Your Climate Classification Climate Foundations Activity
http://classic.globe.gov/fsl/pdf/2011/What_Is_Your_Climate_Classification.pdf

Task 2: Factors that affect Temperature

Describe Factor (i.e. grass surface, brick building close)	Impact on Temperature +, -, =, or ?

Task 3: Select Comparison Locations

- Identify comparison areas on sketch
- Predict temperature differences

How will the air temperature in each area compare? Why?

Task 4: (OUTSIDE)
Document Sites & Measure Temperature

Date of Observation:			
Area	Record Area Observations (i.e. patchy grass, plant species)	Air Temperature	Other Important Details

Task 5: Compare & Analyze

Did your predictions on the microclimate of the two areas you selected match with your observations?

Provide possible explanations.

What other factors could affect air temperature?

Scientific Research Process

Observe Nature

Pose Questions

Develop Hypothesis

Plan Investigation

Assemble Data

Analyze Data

Document Conclusions

Present Findings

Pose New Questions

https://www.globe.gov/do-globe/for-students/be-a-scientist/steps-in-the-scientific-process

Observations

- How do we make “observations”?
- What’s so important about making observations?
- What makes it challenging?

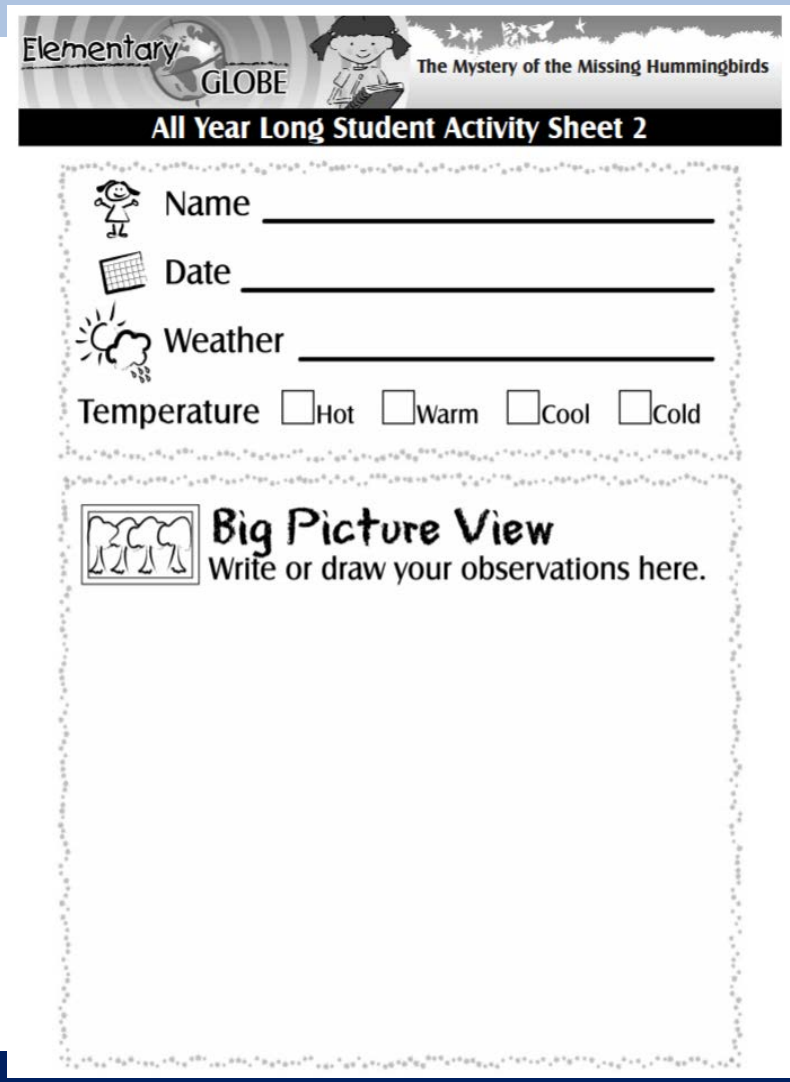
https://www.globe.gov/do-globe/for-students/be-a-scientist/steps-in-the-scientific-process/observe-nature

Another Example: Making Observations

Using a science notebook, let's document our environment

- Both drawings and descriptive words

What questions do you have based on your observations?



From Elementary GLOBE "All Year Long" Activity
https://www.globe.gov/web/elementary-globe/overview/seasons/learning-activities

Questions vs Research Questions

Research Question Characteristics Worksheet	Points (0 or 1)
The answer is not immediately obvious	
There could be more than one answer - the answer is not just yes or no	
Encourages a new or different view of phenomena	
Narrow in focus so that the necessary research can be done	
Clear enough for other people to understand	
Tests an accepted explanation	
Completes or adapts an existing explanation	
Goes beyond existing explanations	
Possible to answer in the time available to you	
Possible to answer with measurement equipment and techniques available to you	
Any data required from others is available or can be obtained through collaboration	
Will sustain your interest for the time required to complete the research	
Tests your assumptions about the phenomenon	
Total Points	

https://www.globe.gov/do-globe/for-students/be-a-scientist/steps-in-the-scientific-process/pose-questions

Making Measurements Count

What non-environmental factors might influence our measurements?

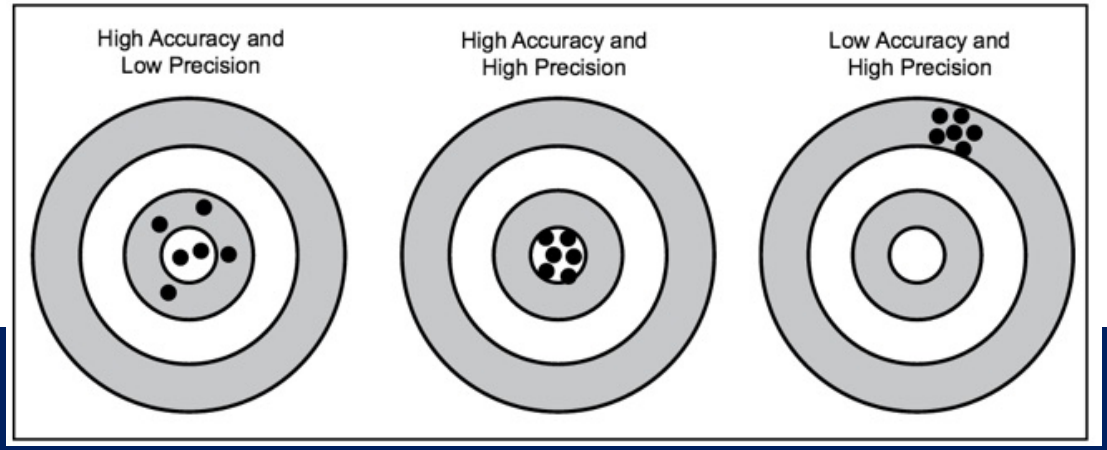
Let's look at current temperature across various instruments…
What value would we report to GLOBE? How do we know if the measurements are accurate?

Making Measurements Count

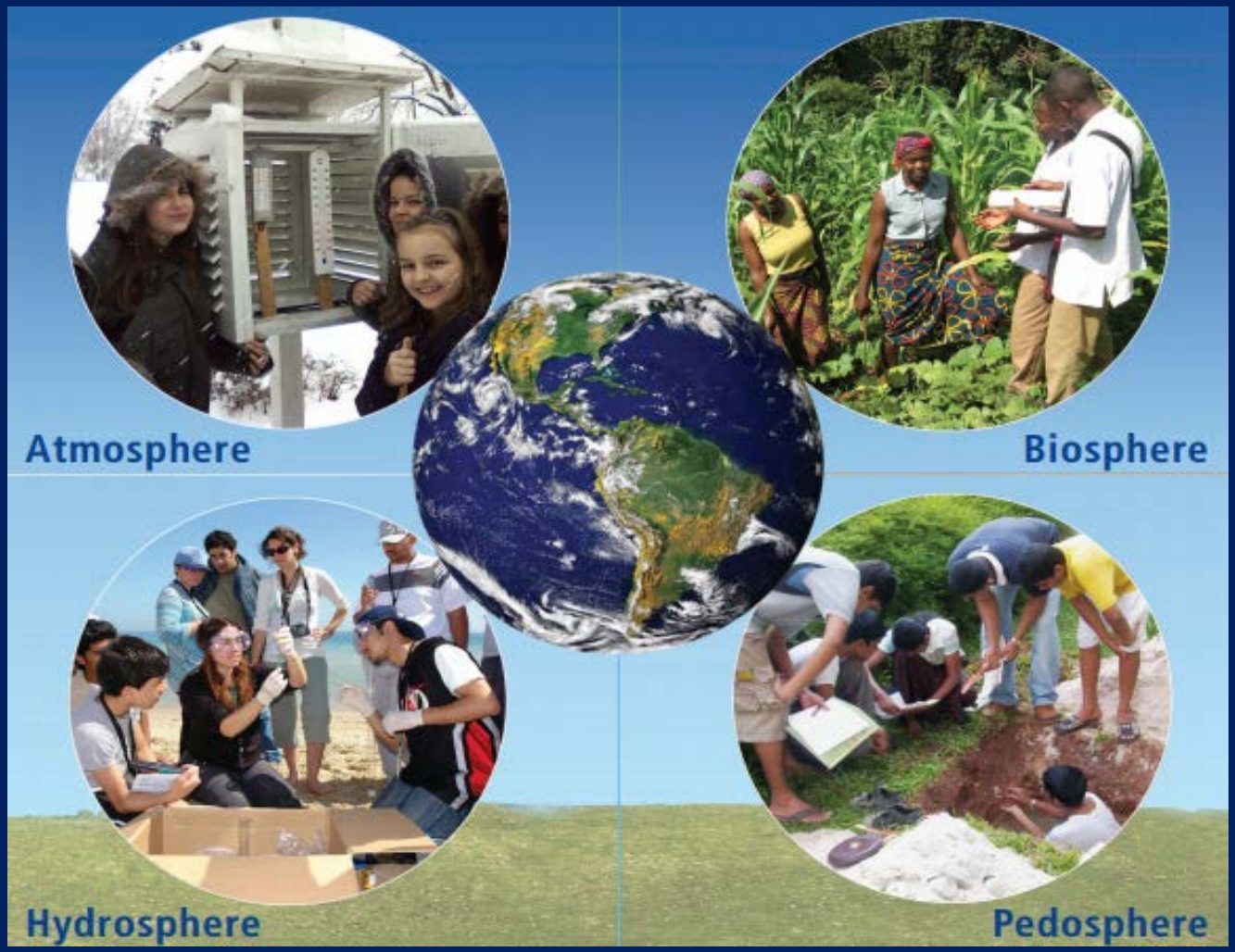
Accuracy is a measure of how well the data describe a phenomenon. We make sure our instruments are accurate by calibrating them.

Precision is demonstrated when repeated measurements yield the same outcome. In most GLOBE protocols, you are asked to take a measurement multiple times – allowing for you – as well as other scientists – to determine the precision of your data.

GLOBE **Protocols** provide steps and procedures for collecting data.



GLOBE Science Investigation Protocols



Instrument Shelter

- Locate away from obstacles
- Place over natural surface
- Shelter should face away from the equator
- Temperature sensor should be 1.5 m above the ground
- After set-up, complete the site definition

Recommended Activity, Studying the Instrument Shelter
https://www.globe.gov/documents/348614/5910806d-1243-4ba3-95cd-87550a7e54a3

Temperature with Instrument Shelter

Instruments

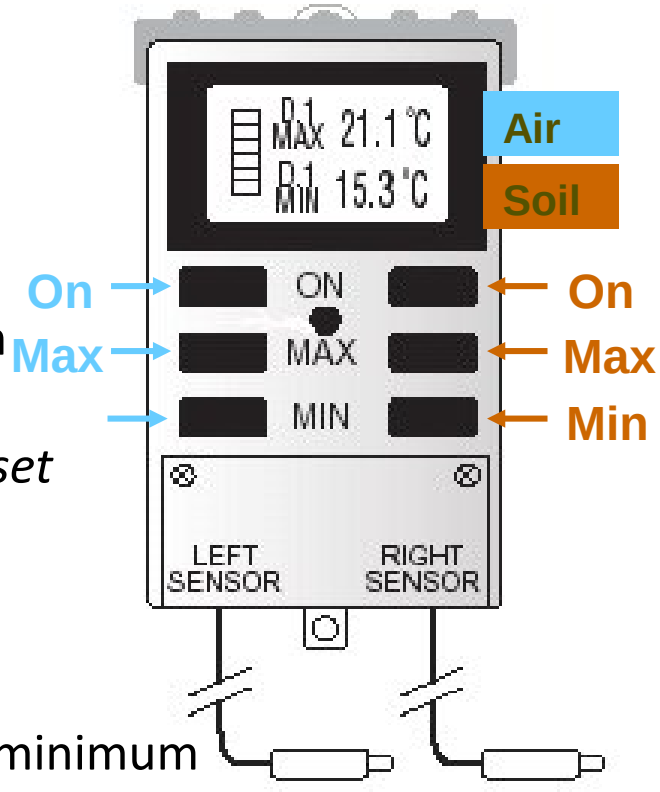
- Digital Mulit-Day Max/Min
- Need Calibration Thermometer

Benefits

- Instruments already out
- Already equilibrated to outside
- More data

Digital Multi Day Max/Min Thermometer

- Two sensors:
  - One measures air temperature
  - One measures soil temperature at a depth of 10cm
- Stores six days of max/min temperatures
- Must be reset to around the time of local solar noon **<u>one time</u>** when it is first set up
- The exact time it is reset is known as the *Time of Reset*



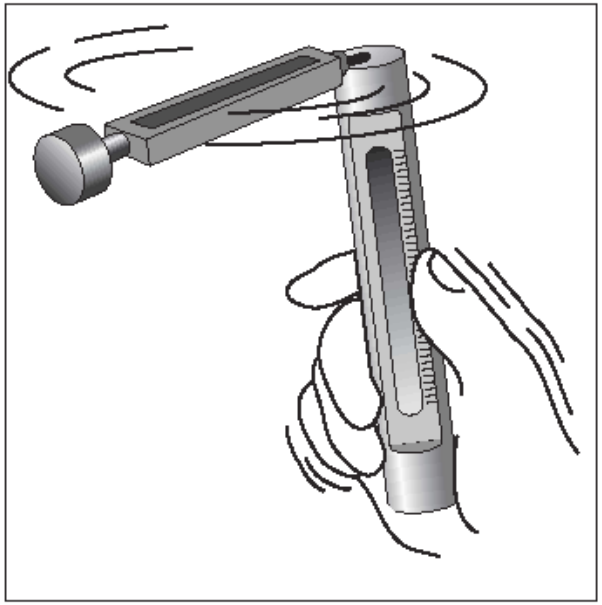
For both air and soil temperatures:

- Press ON button to read current temperature
- Press the Max/Min button <u>twice</u> to read maximum/minimum temperature of first day (D.1)
- Continue to press Max/Min Button <u>once</u> to read temperatures of other days (D.2-D.6)

Digital MultiDay Thermometer Data Sheet
https://www.globe.gov/documents/348614/00bfb4e8-384c-4d63-a781-ae1624bc97c4

Temperature without Instrument Shelter

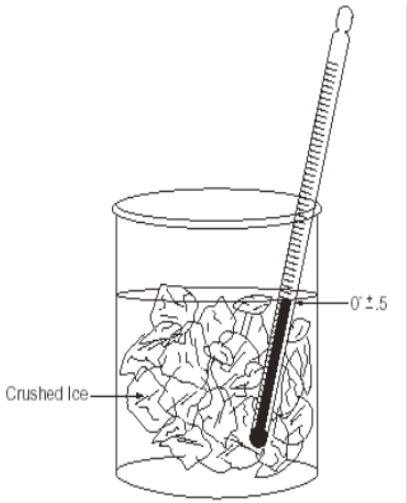
- Instruments
  - Calibration Thermometer
  - Sling-psychrometer
- Considerations
  - Takes 3-5 min to equilibrate
  - Minimize ‘influences’ when reading T
    - Record every 3 min
    - Avoid Direct Sun (need shade)
    - Consider Ground cover
  - Transporting instrumentation
  - Calibration



Suggested activity: Building a Thermometer
https://www.globe.gov/documents/348614/e28a888c-830f-484a-8997-a660a3d48fe1

Calibrating Temperature

1. Submerge calibration thermometer in an ice-water bath for 10-15 minutes, stir occasionally
   Calibration thermometer should read between -0.5° C and +0.5° C
2. Hang calibration thermometer in instrument shelter
   Read five sets of readings
   Record and report data to the GLOBE website



Thermometer Readings

Reading Number	Date (Year/ Month/Day)	Local Time (Hour:Min)	UT Time (Hour:Min)	Calibration thermometer readings (°C)	Digital air sensor readings (°C)	Digital soil sensor readings (°C)
1						
2						
3						
4						
5						

Thermometer Calibration Lab
https://www.globe.gov/documents/348614/ff1147e1-6ae3-4eb1-b38c-20021910c0a8

Temperature Test

Taking accurate temperature readings

- Do not breathe on, touch, stand too close or expose the thermometer to direct sunlight when using it.
- Read thermometer at eye level
- Read temperature from base of indicators
- Record current temperature
- Record maximum and minimum temperatures
- Record date and time (UTC)
- If no measurement for previous day, record only current temperature
- Reset maximum and minimum temperature markers

Calibrate IRT

You should test that the infrared thermometer is measuring accurately. This can be done by testing the temperature of ice water. Ice water should be 32° F (0° C).

An infrared thermometer is measuring correctly if the instrument reads the temperature of the ice water bath within the range of 28-36° F (+/- 2° C). If the temperature observed is more than 36° F (+2° C), or less than 28° F (-2° C), try changing the battery. If the calibration still is off, the infrared thermometer needs to be replaced.

Surface Temperature

- Once outside, look for a good area to observe surface temperature. Any surface can be used.
- Hold your arm at arm's length and point the instrument at the ground. Press the Recording Button to record the temperature.
- Be sure to have the instrument Sensing Eye parallel to the surface you want to measure. Be careful to not inadvertently record the temperature of your shoe or the surface in your own shadow.

Image: Kevn Czajkowski

Some questions to investigate:

- How does surface temperature compare with current air temperature?
- How does surface temperature vary with surface soil color?
- How does surface temperature change for different cover types (grass vs. asphalt for instance) on a cloudy day?
- How does the surface temperature change for different cover types when it is wet versus when it is dry?

Clouds : updated Protocol planned March

Atmosphere Investigation: Cloud Protocol Data Sheet 1

Observer Name:_____ Study Site:_____

Date (ex. 2016 01 13): Year: _ _ _ _ Month: _ _ Day: _ _

Time (ex. 24 Hour Clock: 14 26): Local: Hour _ _ Minute _ _ Universal: Hour _ _ Minute _ _

1. What is in Your Sky?

Total Cloud/Contrail Cover:

- ○ Sky is Obscured
- ○ None (Go to box 2)
- ○ Few(<10%)
- ○ Isolated (10-25%)
- ○ Scattered (25-50%)
- ○ Broken (50-90%)
- ○ Overcast (90-100%)

- ○ Fog
- ○ Heavy Rain
- ○ Heavy Snow
- ○ Blowing Snow
- ○ Sand
- ○ Spray
- ○ Smoke
- ○ Dust
- ○ Haze
- ○ Volcanic Ash

Go to box 6

*If you can observe sky color or visibility, complete box 2

2. Sky Color and Visibility

Sky Color: ○ Cannot Observe ○ Deep Blue ○ Blue ○ Light Blue ○ Pale Blue ○ Milky

Sky Visibility: ○ Cannot Observe ○ Unusually Clear ○ Clear ○ Somewhat Hazy ○ Very Hazy ○ Extremely Hazy

3. High Level Clouds

○ No High Level Clouds Observed (Go to box 4)

Cloud Type:

- ○ Contrails (number of):
- ○ Cirrus
- ○ Cirrocumulus
- ○ Cirrostratus

# # #

Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

4. Mid Level Clouds

○ No Mid Level Clouds Observed (Go to box 5)

Cloud Type:

- ○ Altostratus
- ○ Altocumulus

Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

5. Low Level Clouds

○ No Low Level Clouds Observed (Go to box 6)

Cloud Type:

- ○ Fog
- ○ Nimbostratus
- ○ Cumulonimbus
- ○ Stratus
- ○ Cumulus
- ○ Stratocumulus

Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

6. Surface Conditions

Mandatory:

	Yes	No		Yes	No
Snow/Ice	○	○	Dry Ground	○	○
Standing Water	○	○	Leaves on Trees	○	○
Muddy	○	○	Raining/Snowing	○	○

Optional:

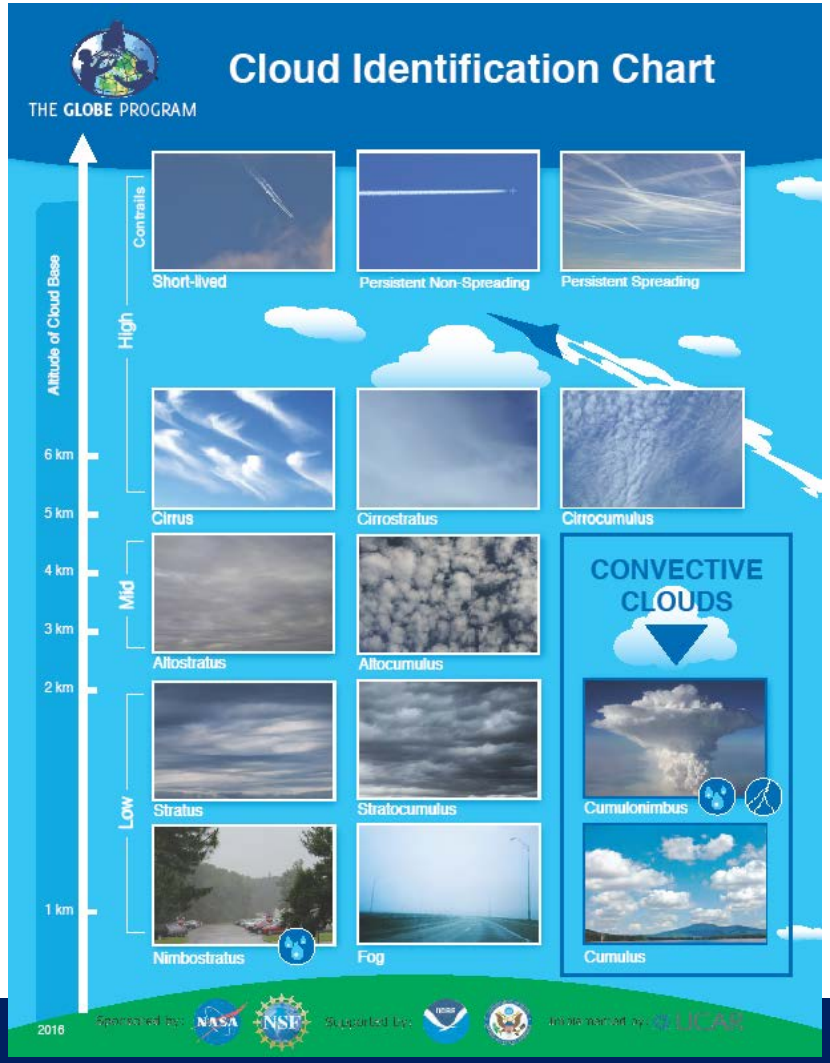
You may submit any or all

Temperature: ___°C

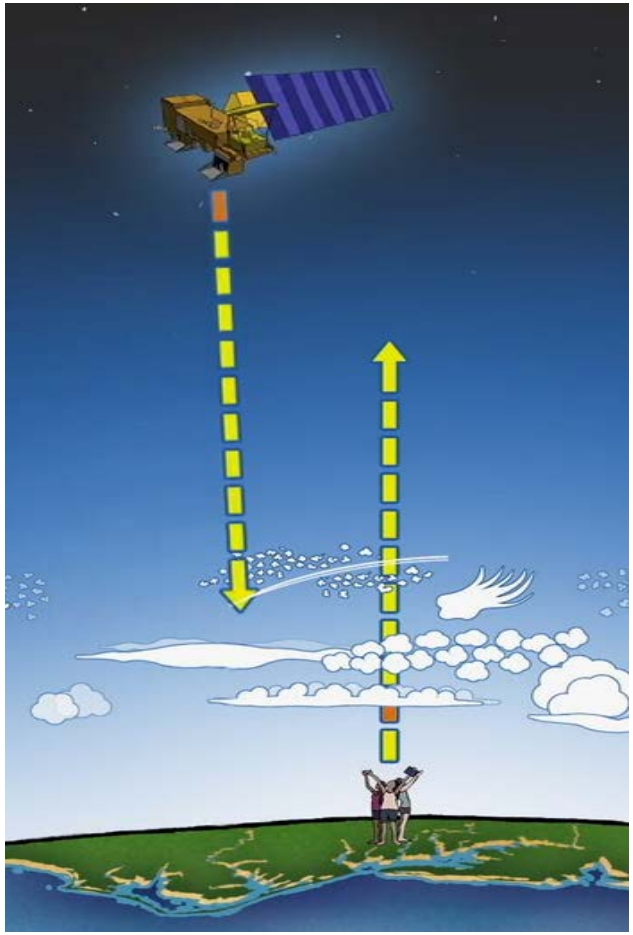
Barometric Pressure: ___mb

Relative Humidity: ___%

Comments:



Clouds : NASA Satellite Matching



Ground Observation:				GEO Satellite					Aqua Satellite				
Date: 2016-11-29		Universal Time: 18:01		Date: 2016-11-29		Universal Time: 17:50			Date: 2016-11-29		Universal Time: 17:55		
Opacity	Cloud Cover	Type	Visualization		Altitude (km)	Opacity	Cloud Cover	Phase Temp(C)		Altitude (km)	Opacity	Cloud Cover	Phase Temp(K)
Total Ground Cloud Cover: No Clouds (0%)				Total GEO Cloud Cover: 100.00 %					Total Aqua Cloud Cover: 98.06 %				
HIGH					6.9	Opaque 53.67	Broken (50%-90%) 73.12	mixed -19.84 (C)		7.14	Opaque 20.82	Broken (50%-90%) 61.46	mixed 248.24 (K)
MID					4.94	Opaque 23.79	Scattered (25%-50%) 26.88	mixed -8.60 (C)		3.72	Opaque 27.16	Scattered (25%-50%) 36.6	mixed 264.39 (K)
LOW	Opaque	Overcast (>90%)	Nimbostratus										
Sky Visibility : no report Sky Color : no report													

Surface Conditions

Snow/Ice	No
Standing Water	No
Muddy	No
Dry Ground	No
Leaves on Trees	No
Raining or Snowing	No

Corresponding Aqua MODIS Satellite Images

Rapid Response

NASA Worldview

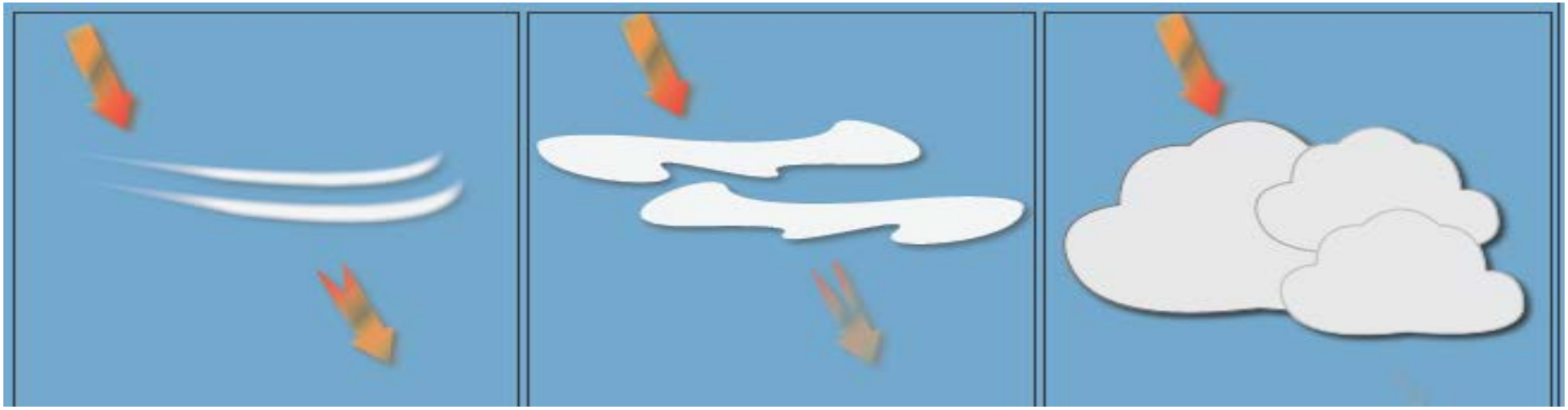
Please comment on the quality of the match: Might there by anything about the ground observations or the satellite data that would explain any disagreement between the two?

Clouds : Opacity

Transparent

Translucent

Opaque



Clouds : Sky Conditions

Visibility

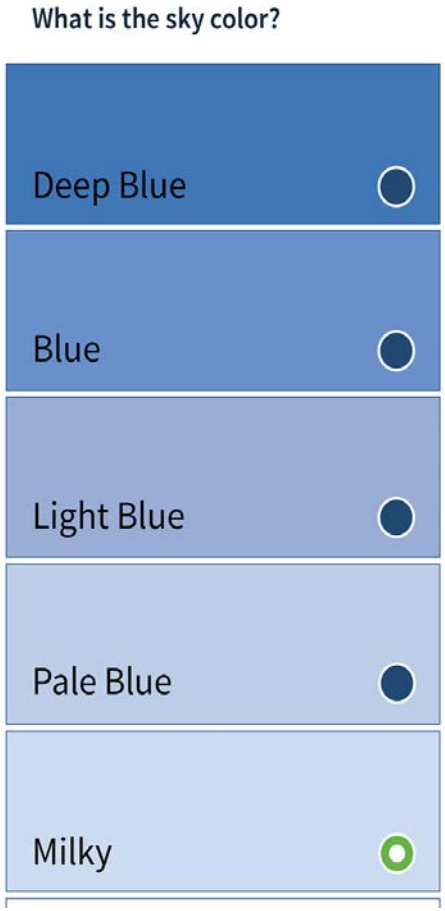
Unusually Clear

Clear

Somewhat Clear

Somewhat Hazy

Extremely Hazy



Sky Color

Deep Blue

Blue

Light Blue

Pale Blue

Milky

Elementary GLOBE: Sky Observers

Elementary GLOBE — What's Up in the Atmosphere?

Sky Observers Daytime Sky Report

Face away from the Sun and look for the deepest color of blue.

Name _____ Date _____

Time ___:___ AM or PM (circle one)

Location _____

Are there clouds?
- ☐ no clouds
- ☐ some clouds
- ☐ lots of clouds
- ☐ fog

Is there precipitation?
- ☐ none
- ☐ rain
- ☐ sleet
- ☐ snow

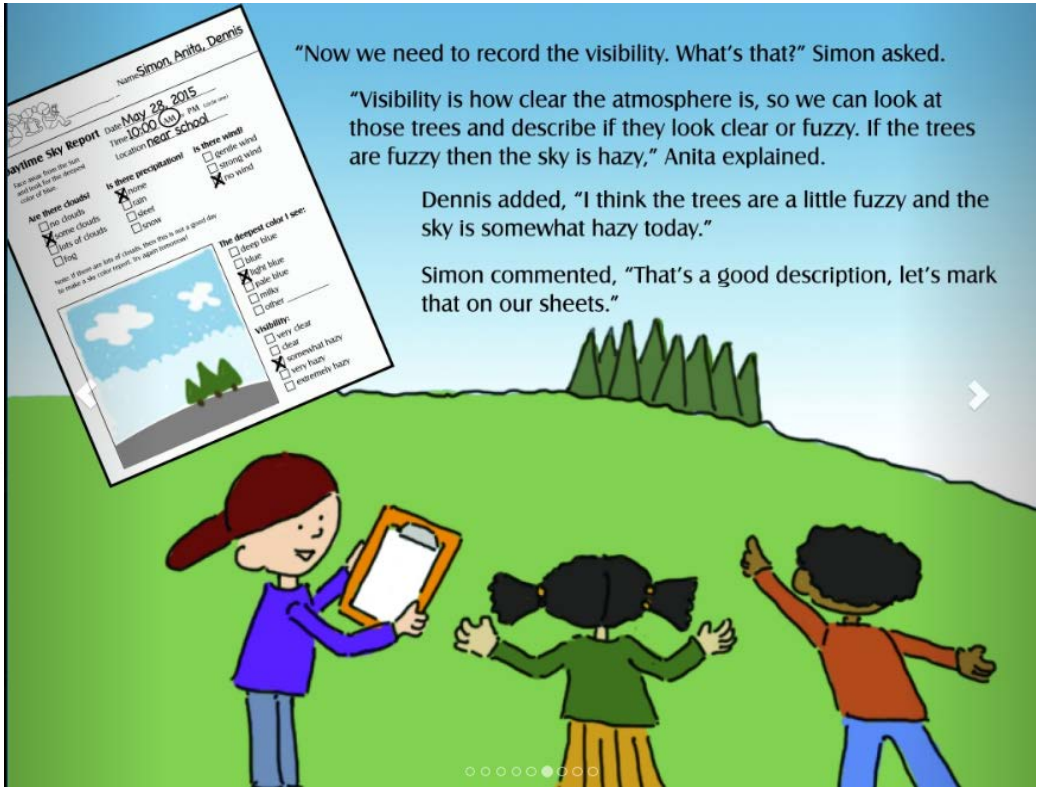
Is there wind?
- ☐ gentle wind
- ☐ strong wind
- ☐ no wind

Note: If there are lots of clouds, then this is not a good day to make a sky color report. Try again tomorrow!

A drawing of my sky:

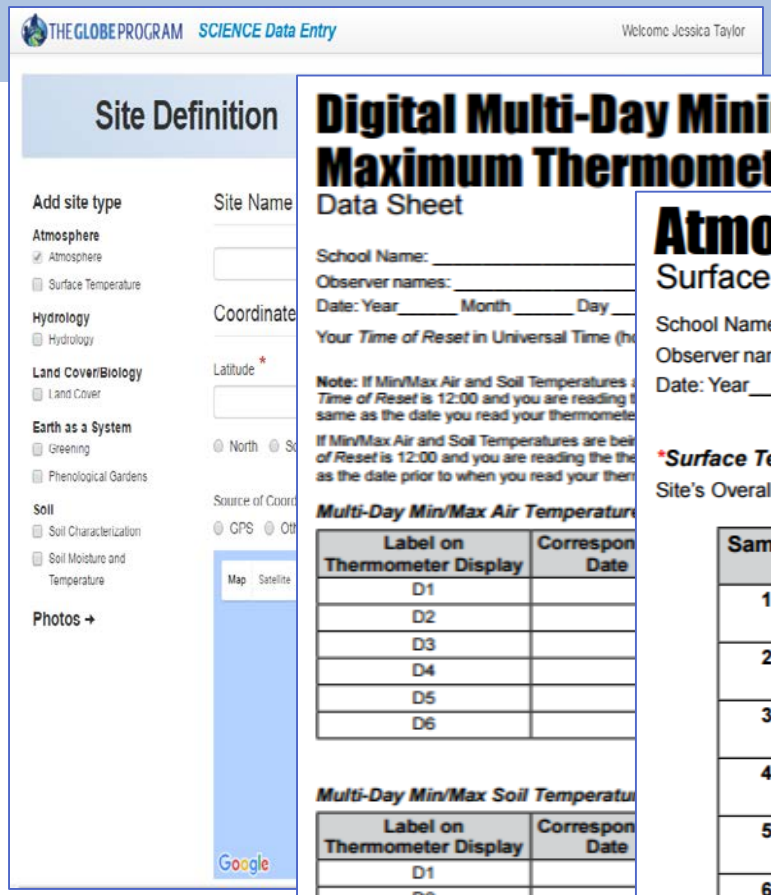
The deepest color I see:
- ☐ deep blue
- ☐ blue
- ☐ light blue
- ☐ pale blue
- ☐ milky
- ☐ other _____

Visibility:
- ☐ very clear
- ☐ clear
- ☐ somewhat hazy
- ☐ very hazy
- ☐ extremely hazy



https://www.globe.gov/web/elementary-globe/overview/aerosols/learning-activities

Let's Make Observations



Data Entry Options

Data Entry - Desktop Forms – These pages are for entering environmental data – collected at defined sites, according to protocol, and using approved instrumentation – for entry into the official GLOBE science database.

Data Entry - Mobile App – The app allows users to enter data directly from an iOS or Android device for any GLOBE protocol.

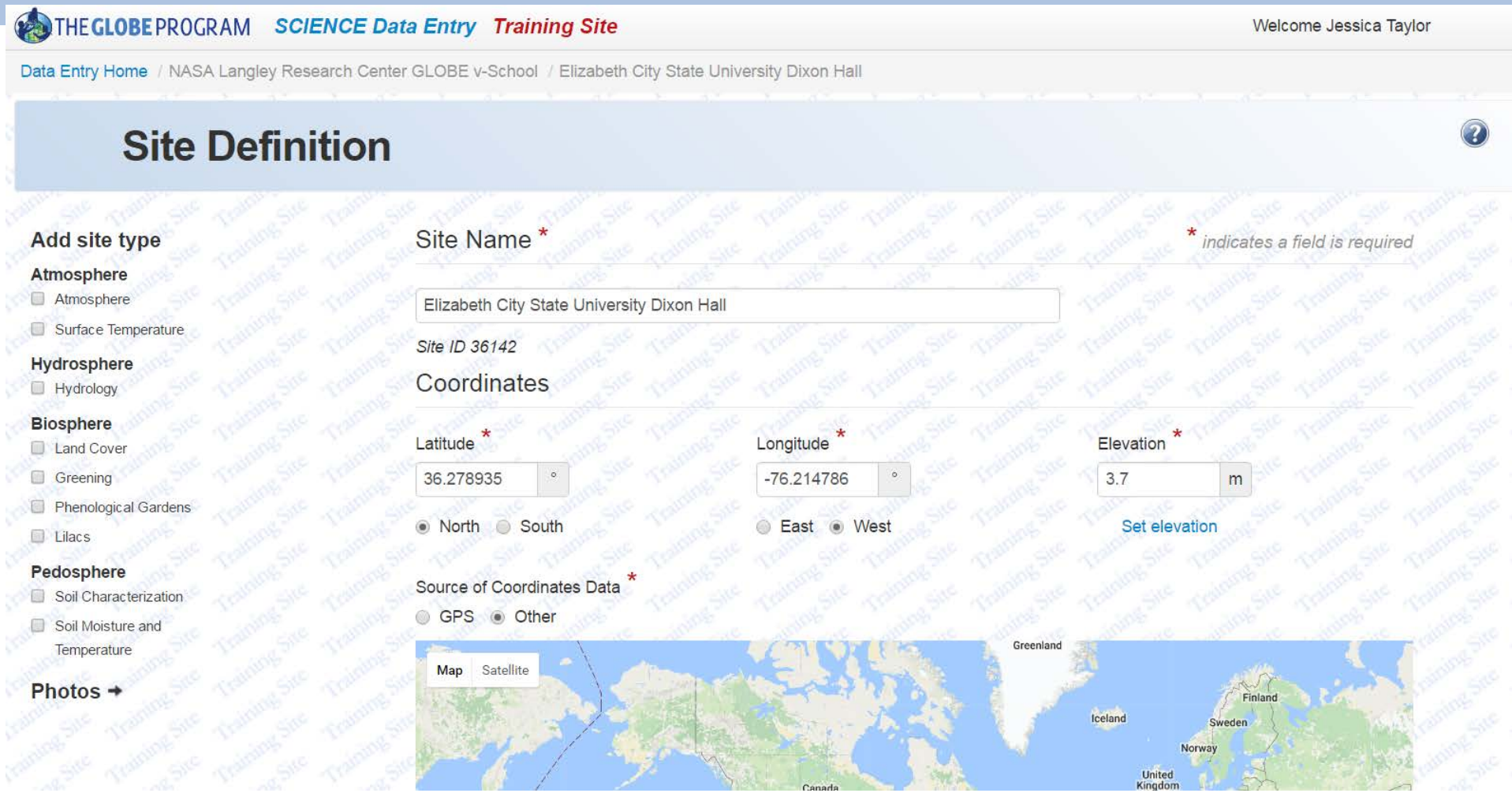
Training Data Entry – These pages are for practicing data entry, either during workshops or when providing others a view of the data entry process. These data entry pages are based on the newer designed data entry pages. These data are not intended for entry into the official GLOBE science database.

GLOBE Observer – Version 1.1 of the app includes GLOBE Clouds, which allows you to photograph clouds and record sky observations and compare them with NASA satellite images. Future versions of GLOBE Observer will add additional tools for you to use as a citizen environmental scientist.

Email Data Entry – Data can also be entered via email.

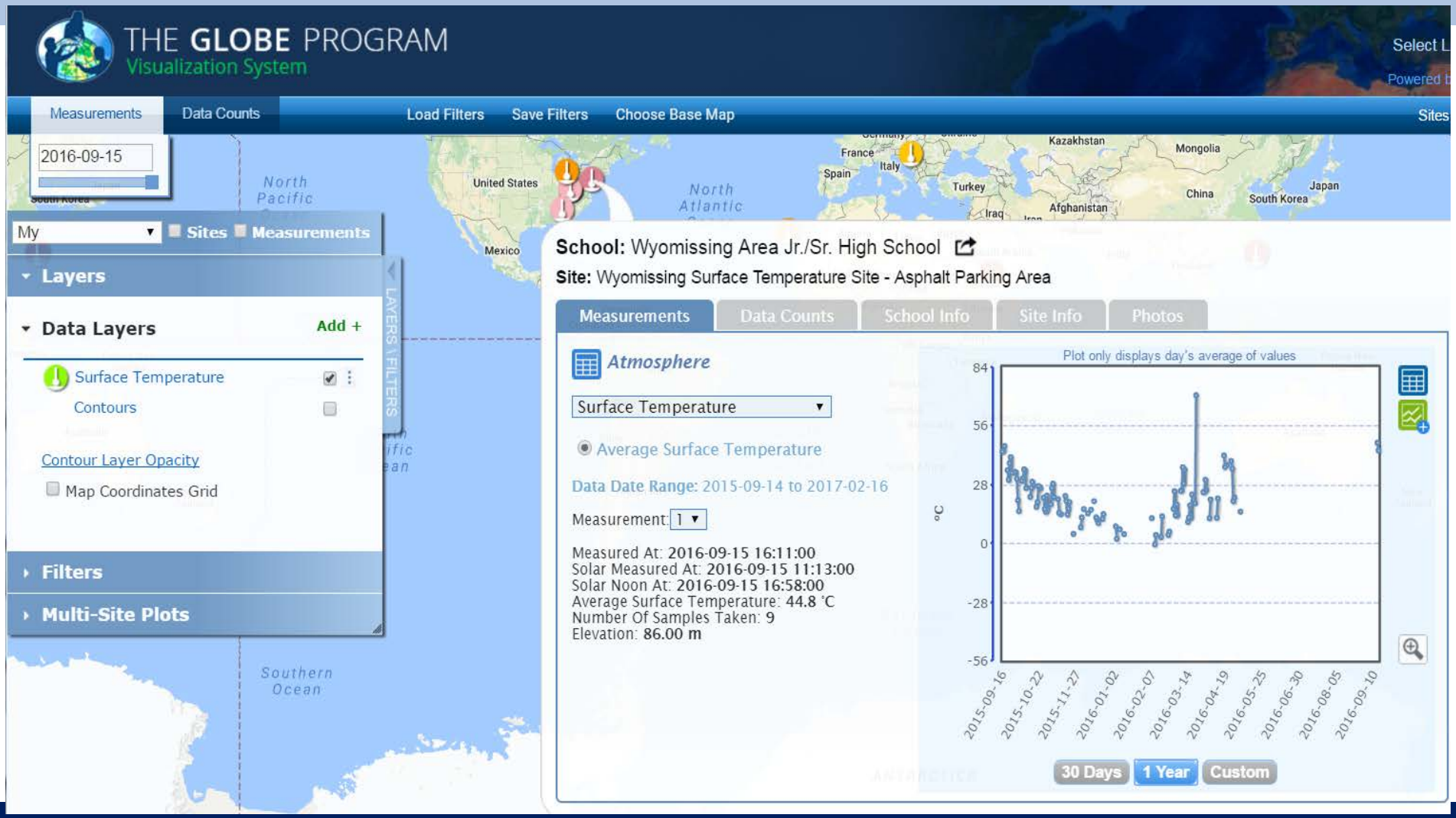
Helpful tutorials about website and data entry:
https://www.globe.gov/get-trained/using-the-globe-website

Data Entry



Go to: training.globe.gov

Data Retrieval and Visualizations



https://www.globe.gov/globe-data/visualize-and-retrieve-data

Are My Data Reasonable?

- Clouds
- Air Temperature
  - Current
  - Maximum
  - Minimum
- Surface Temperature

It should be stressed that your students may collect accurate data that is unexpected. Estimating what to expect will also help students recognize when their data are unusual and should prompt more investigation.

What To Do and How To Do It

Stage 1 — Estimating data about classroom objects

1. Divide your class into teams of four students. Provide each team with measuring instruments and have the teams collect classroom data. Each team should collect and record 5 to 10 classroom data values.

   Beginning students might:
   - count the number of books, tiles, fingers, etc. in the classroom
   - measure the length of ten books, the room, around a desk, etc.
   - measure the amount of water in a glass, the sink, etc.

   Intermediate students might:
   - measure and add distances (the height of a desk and all the desks in the room)
   - calculate the height of all text books piled together.

   Advanced students might:
   - calculate areas in square meters, volumes in cubic centimeters, and weights..
2. Now have each team "disguise" part of their data by exaggerating the numbers. For instance, a cube with a volume of 10 cubic centimeters should be changed to 20 or even 200 cubic centimeters. The less
5. At the end of the activity, discuss the process of estimating, and the concept of reasonableness. You might want to repeat this activity to see if the students improve.

Stage 2 — Estimating soil water content data

Your students will apply the same concept to soil moisture (you can play the data game with any type of data). You can use soil moisture data that your students have already collected as part of the protocol, or with soil moisture data from the samples students brought from home as part of the learning activity *Soils as Sponges: How Much Water Does Soil Hold?*

As described in Stage 1 above, have your students change some of the data values for soil water content, and then have other students guess which values are accurate and which are exaggerated. Score as described above.

Stage 3 — Using data from the GLOBE Student Data Server

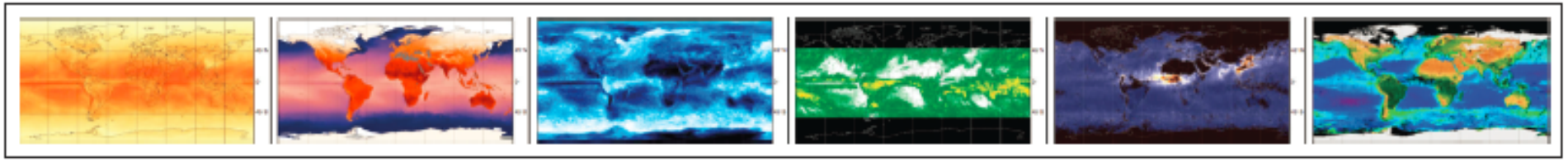
1. Have the students access the GLOBE Student Data Server to browse through soil water content data that have been gathered by other GLOBE sites. They should find:
   - the range of data for each depth
   - the range of data for schools nearby
   - the range of data for schools in arid regions or forests or grasslands
   - the most common values.
2. Discuss the ranges and common values, and have your students reflect on how this information would help them to do better in the data game.

Suggested Activity: The Data Game
https://www.globe.gov/documents/352961/5a184b04-9ac0-4284-be86-f5938bd43a6f

Investigating Earth Systems Images

Explore the Images:

- What variable did you examine and what is the range of values shown on the scale bars?
- Where in the world do you find the highest and lowest values (the extremes) of the data in your images?
- Why do these locations experience the extremes and not other locations?
- What changes do you see through the year?
- Are any patterns in the data noticeable?



https://www.globe.gov/do-globe/for-teachers/earth-system-science-posters

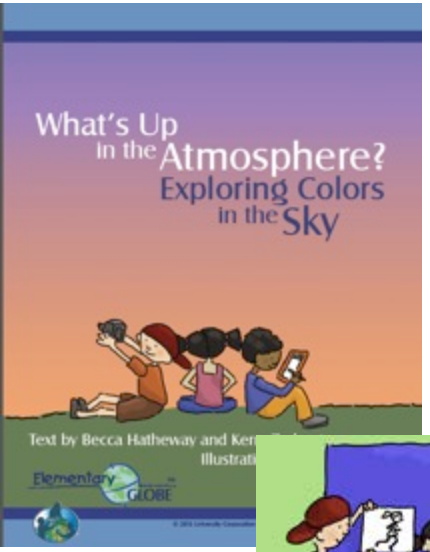
GLOBE Implementation Across Grade Bands

- What considerations do we need to make for implementing GLOBE at different grade bands?
- Where does GLOBE best fit into the curriculum?

Science & Engineering Practice Skills

1. Asking Questions
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations
7. Engaging in argument from evidence
8. Obtaining, evaluating and communicating information

Aerosols Storybook – Picture Walk



https://www.globe.gov/web/elementary-globe/overview/aerosols/story-book

Elementary GLOBE Storybooks & Inquiry

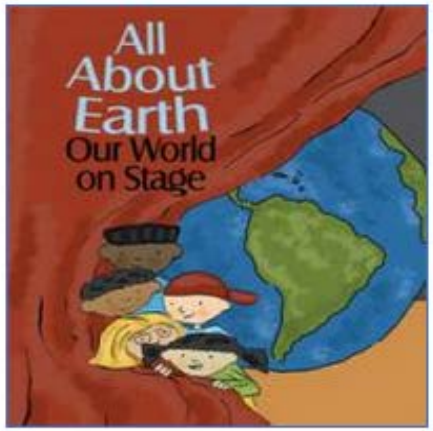
1. Questions	2. Evidence	3. Explanations	4. Connect	5. Communicate
Learner engages in scientifically oriented questions	Learner gives priority to evidence in responding to questions	Learner formulates explanations from evidence	Learner connects explanations to scientific knowledge	Learner communicates and justifies their explanations

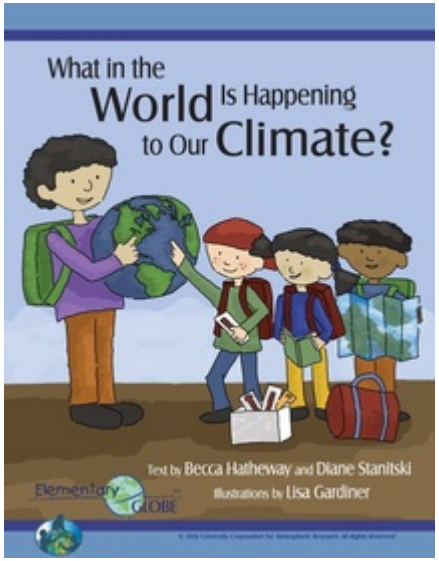
Figure 3. Essential Features of Classroom Inquiry (Taken from the National Research Council's *Inquiry and the National Science Education Standards*).

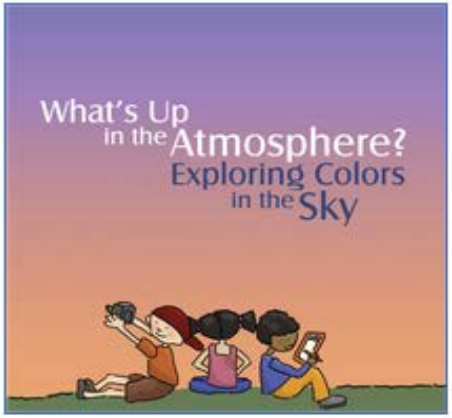
1. Questions	2. Evidence	3. Explanations	4. Connect	5. Communicate
The GLOBE Kids ask, "Where did the hummingbirds go?" after observing the birds' disappearance in their garden.	Simon makes a chart to record their observations of the soil from the three different holes that Scoop had dug.	The GLOBE Kids look at their wall charts of observations and explain that the hummingbirds could stay there only when they had enough food and shelter.	Scientist Hannah helps the GLOBE Kids connect their observations to the snowmelt feeding the creek.	The GLOBE Kids each justify why their part of the Earth system is most important, and then how each is connected in the Earth system, during the classroom play.

Figure 4. Examples of the Five Essential Features of Inquiry from the *Elementary GLOBE* storybook narratives.

Exploring Earth Science through GLOBE Elementary Story Books





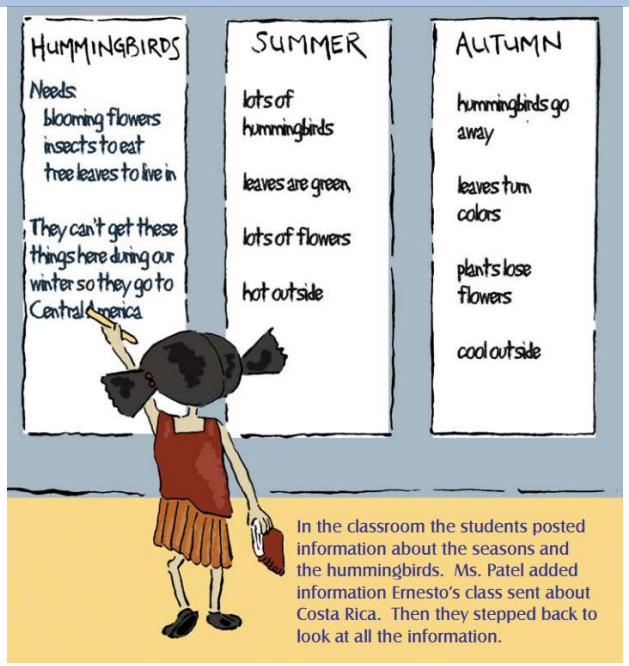


https://www.globe.gov/web/elementary-globe

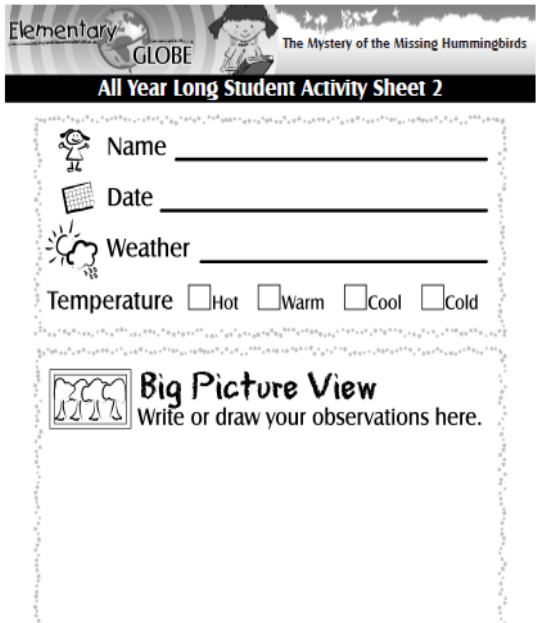
Elementary GLOBE Progression Example
Book -> Activities -> GLOBE Data Collection

Anita REALLY likes Hummingbirds

She watches them.
She draws pictures of them.
But one day in the fall, the birds are mysteriously gone. Simon, Anita, Dennis, and their classmates discover why the hummingbirds left and where they went.



In the classroom the students posted information about the seasons and the hummingbirds. Ms. Patel added information Ernesto's class sent about Costa Rica. Then they stepped back to look at all the information.


Elementary GLOBE
The Mystery of the Missing Hummingbirds

All Year Long Student Activity Sheet 2

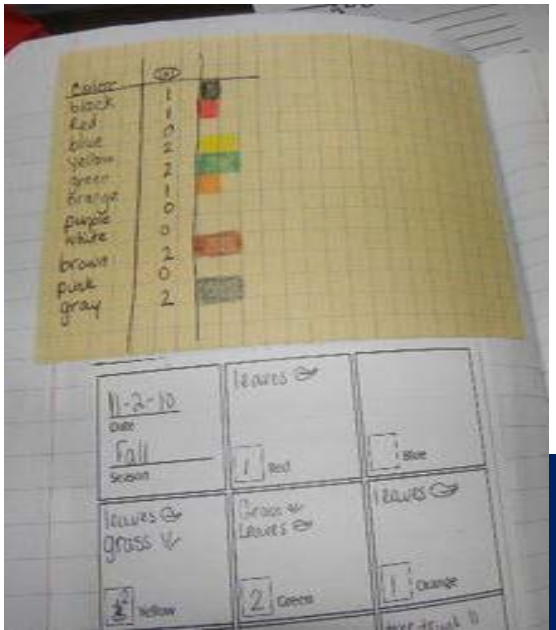
Name _____

Date _____

Weather _____

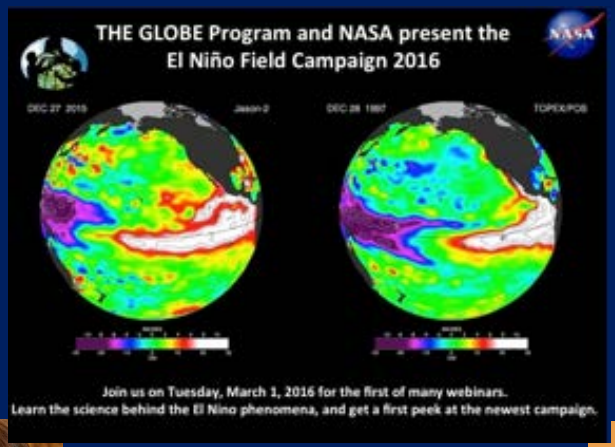
Temperature ☐Hot ☐Warm ☐Cool ☐Cold

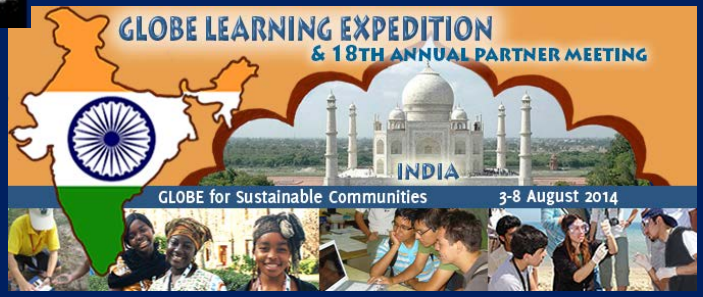
Big Picture View
Write or draw your observations here.



Green-Up / Green-Down

GLOBE Engagement Events





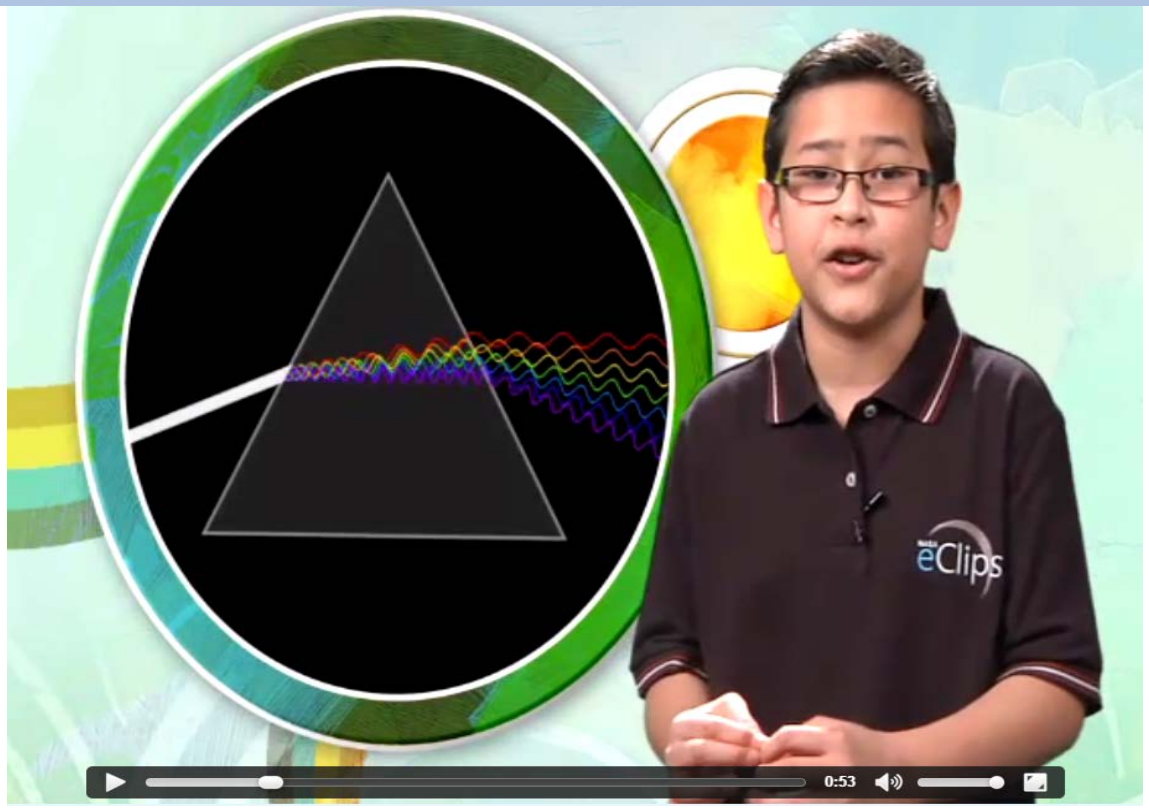
Contact NASA Langley GLOBE Partnership

- Questions about Implementation? Please feel free to contact us.
- Jessica Taylor, Lead GLOBE Trainer
  jessica.e.taylor@nasa.gov
  (757) 864-6358
- Partnership Webpage:
  http://www.globe.gov/web/nasa-langley-research-center/overview

NASA Resources in Elementary

- NASA Education Website http://www.nasa.gov/audience/foreducators/k-4/index.html
- NASA Science Education Lessons: http://nasawavelength.org/
- The Space Place: http://spaceplace.nasa.gov/
- Climate Kids: http://climatekids.nasa.gov/
- NASA e-Clips, Our World: http://nasaeclips.arc.nasa.gov/playlists/ourworld

Our World: Sunsets and Atmospheres (SAGE eClips for Elementary)



Watch online at: http://science-edu.larc.nasa.gov/skycolor/video/