Weather Tourists: A GLOBE Data Exploration

Purpose

Students build geography skills while learning how to find data using the GLOBE Data Visualization tool, sharing what they have learned in a tourism poster for a GLOBE school location.

Overview

Students search for data about temperature and precipitation using the GLOBE Data Visualization tool, learn about the weather of a place of their choosing, and then make a tourism poster to highlight the weather travelers can expect in that location.

Student Outcomes

Students will be able to:

- Interpret graphs of GLOBE data
- Assess whether a data set is complete
- Combine geographic information with environmental data and visuals to describe a place on Earth

Science Concepts

- *Earth Systems Science*
- *Weather and Climate*
- *Weather can be described with quantitative measurements*
- *Weather changes day to day and over seasons.*

Science Practices

- *Analyzing and interpreting data*
- *Obtaining, evaluating, and communicating information*

Time

Two class periods (100 minutes)

Level

Middle and high school (grades 6-12)

Materials and Tools

- *Finding Weather Data Instructions*
- *Weather Tourist Poster Checklist*
- Computers with Internet access and a printer
- A projector and screen
- Supplies for creating tourist posters including paper or posterboard, glue, and markers (Alternatively, have students create digital posters using presentation software or a design program.)

Preparation

- Copy the *Finding Weather Data Instructions* for each student pair.
- Copy the *Weather Tourist Poster Checklist* for each student pair.
- Bookmark the URL (vis.globe.gov) on each computer.
- Prepare to support students in this activity by familiarizing yourself with the GLOBE Visualization tool.

Background

Weather is the mix of events that happen each day in our atmosphere. Weather is different in different parts of the world and varies day-to-day, season-to-season, and even year-to-year. Some regions have more variation than other places. For example, equatorial locations have far less variance than polar locations through the year.

The average weather pattern in a place over several decades is called climate. Different regions have different regional climates.

Climate can be defined as the average weather in a place over thirty years. To describe the regional climate of a place, people often describe how temperature varies over the seasons, how windy it is, and how much rain or snow falls. The climate of a region depends on many factors including the amount of sunlight it receives, its elevation above sea level, the shape of the land, and how close it is to oceans. Since the tropics receive more direct sunlight than the polar regions, climate varies depending on its distance from the equator.

Climate and weather involve the same factors including temperature, precipitation, humidity, wind, cloud cover patterns, and storms.

Scientists examine 30 years of weather data to characterize the climate of a location, to define what is deemed to be "normal", by compiling the prevailing set of weather conditions calculated over a 30-year period, such as 1981 to 2010. In this activity, students are looking at much shorter weather records, but it is still enough information to be able to understand what the weather in a location is generally like. Just as a person living in a place for a year is able to communicate to someone else what the weather is generally like, looking at a year or two of weather data for the place provides a sense of the typical weather.

About the data: In this activity, students explore temperature and precipitation data collected by schools around the world that are part of the GLOBE Program. Some schools have participated for only a short time and have made only a few measurements. Other schools have participated for years and make daily measurements of temperature, precipitation, and other aspects of the atmosphere. Some schools report about their soils, biosphere, and hydrosphere as well. In this activity, students look for locations that have at least a year of temperature and precipitation measurements without significant breaks. Several years of data would be even better.

What To Do and How To Do It
Step 1. Engage students with the project.

- Ask students how they decide what to pack for a trip to a place where they have never been before. How do you know what the weather is like? (They might look at the weather forecast for the place, or they might take the advice from someone who has been to that place and knows the general weather patterns.)

- Tell students that in this activity they will explore weather patterns of a place and then make a tourism poster about the place and its weather.

- Pass out a copy of the *Finding Weather Data Instructions* to student pairs. Project the GLOBE Visualization Tool (vis.globe.gov) on the screen and demonstrate the process of looking for a GLOBE school location and data.

Step 2. Students explore GLOBE data.

- Assign each student pair a computer. (You can have students do this activity individually if you'd prefer.)

- You may wish to assign student pairs different continents to explore to help focus their work and ensure the class covers the world.

- Have students find a location for their tourist poster using the GLOBE Visualization Tool and download graphs of the temperature and precipitation data for that location following the *Finding Weather Data Instructions*.

- Students may need help identifying data that is complete for at least a year and hopefully more than a year. Have student pairs check in with you once they have graphs of temperature and precipitation to make sure they do not have large gaps in the data (weeks or months during which data was not collected).

Step 3. Students create a tourism poster to communicate what they have learned about the place.

- Ask students to brainstorm activities that they think would be fun for tourists in the location they have selected. Students

should base their brainstorm on the weather that they discovered using the GLOBE Visualization Tool and the geography of the area. Is there winter snow and mountains that would be good for skiing? Is it warm and sunny which might be good for swimming or hiking?

- Pass out the *Weather Tourist Poster Checklist* to each pair of students and review the list as a class.

- Have students find photos of their location for their poster online and develop their poster with the weather and geography information they found during Step 2 as well as the pictures of the place.

Step 4. Students extend their learning by sharing the posters and assess learning.

- Have students decide how they want to organize their gallery. Suggest that they organize their gallery by either geography or weather.

- Have students browse the tourist posters, taking notes about the weather in different locations. Evaluate student learning by having each student write three short paragraphs to compare the weather in their tourism location with the weather of three other poster locations.

- If you had students make digital posters using presentation software, project posters and have student pairs present about their location in one minute while the rest of the class takes notes.

Assessment

- The three short paragraphs that students write in Step 4 should include both how precipitation and temperature fluctuate through the seasons in three different locations as compared with the one they used for the tourism poster. (Answers will vary depending on the locations.)

- Use the rubric below to assess student posters.

Category	4	3	2	1
Title	The title conveys both the location and the tourist activity that the poster highlights.	A title is included which does not include both the location or activity.	The title does not convey the location or tourist activity.	A title is not included.
Required Content: Physical Characteristics	All the items on the checklist are included.	One item from the checklist is missing.	Two items from the checklist are missing.	Three or more items are missing.
Required Content: Human Characteristics	All the items on the checklist are included.	One item from the checklist is missing.	Two items from the checklist are missing.	Three or more items are missing.
Spelling and Grammar	There are no spelling or grammar errors.	There are one or two spelling and/or grammar errors.	There are three or four spelling and/or grammar errors.	There are five or more errors.
Layout and Design	The poster design helps convey the information about the place and its tourist activity.	The poster design helps convey some information.	Design was considered, but does not help convey information.	Design was not considered.
Citing Sources	Sources are cited with complete information.	Sources are cited but with incomplete information.	Not all sources are cited.	No sources are cited.

Extensions:
Delve Deeper into GLOBE Data

- Follow this activity with the *Make a Climograph* GLOBE Data Exploration to extend student learning and emphasize that it takes much more than a couple of years of data to define the climate of a location.

- If your school collects GLOBE atmosphere data, have students make tourist posters for their own community that highlight the weather you can expect.

- To connect this activity with learning about Earth's tilt and seasons, have students compare temperature data in opposite hemispheres.

- Explore the role of the visual arts and language in advertising while students are developing their posters. Have students consider what feelings they are trying to communicate as they choose fonts and colors for their posters.

Credits

This activity is part of *GLOBE Data Explorations*, a collection of activities developed by the UCAR Center for Science Education (scied.ucar.edu), a GLOBE partner. Activities were reviewed by science educators and staff at GIO and field tested by teachers.

Weather Tourists
Finding Weather Data Instructions

For this GLOBE Data Exploration, choose a location for your climate travel poster and look at the data about the atmosphere collected at that location.

Step 1: Which continent would you like to explore?

☐ Africa

☐ Asia

☐ Australia

☐ North America

☐ South America

☐ Europe

Why are you interested in this continent?

_____

_____

Step 2: To find a location where GLOBE atmosphere data has been collected, go to the GLOBE Visualization System online at: http://vis.globe.gov/
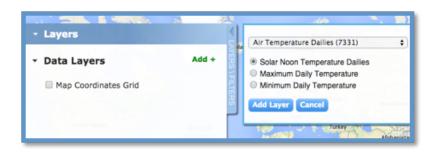
Note: The welcome message that opens on top of the map (see image at right) tells you about the system and where to find the online tutorial if you are new to the system.

Step 3: Close the welcome message (by clicking the X in the upper right of the gray box) to reveal the map. Since you are looking for locations with a lot of GLOBE data, you'll want to click on "data counts" by map type in the upper left. Notice that when you click "data counts" a range of dates appears below it. The full range (starting in 1995) is the maximum timespan over which GLOBE data was collected by students around the world.

Step 4: Click on the green "add+" link by "data layers" and a box will appear with a menu of data types. Since you are looking for atmosphere data to give you information of the climate of GLOBE school locations, select "Air Temperature Dailies". Click the "add layer" button.

Note: You can go back in and add precipitation, humidity, clouds, and other aspects of weather and climate as well if you'd like. It is easier to start your search with one aspect of climate, such as temperature, and then add other aspects once you narrow down the location.
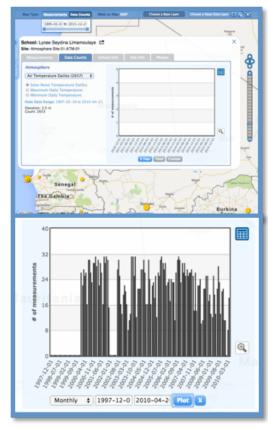

Step 5: Many yellow circles will appear on the map when you choose the air temperature data layer. The larger circles are places where more measurements of air temperature have been made (like at left). Zoom in to the continent that you identified in Step 1 above. (Zoom tools are located on the right side.)
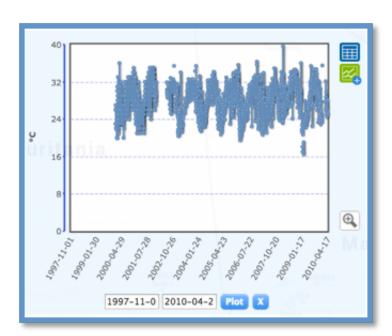
Note: It may take a couple of seconds for the yellow dots to reload in the correct locations as you zoom into an area on the map.

Step 6: Click on a large yellow dot on the map to find information about the GLOBE school where the data was collected, how many measurements were made, and over what timeframe. The icon to the right of the school name will open a page about the school and its location. Note the city or town name, country, elevation, latitude, and longitude.

Note: If the school is not actively collecting GLOBE data, the graph of data counts will appear blank, as in the example at the upper right. Choose the "custom" button under the graph and input the range of dates shown as the "data date range" on the left side of the window to ensure that there is enough data to determine what the environment there is like (example at lower right).
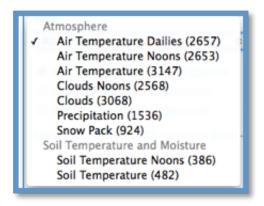
Step 7: Click the "measurements" tab to access the temperature data. Choose "custom" under the graph to enter the data date range that is given on the left side of the window and then click the "plot" button to create a graph of the data. The magnifying glass to the right of the graph will enlarge it. Print the large graph or save it as a PDF file to use for your tourism poster.

Note: If you'd like to narrow the number of years of data so that you can see seasonal cycles, you can change the date range below the graph and click "plot" again to make a new graph. Roll over the graphed line and you can see the dates of the data.
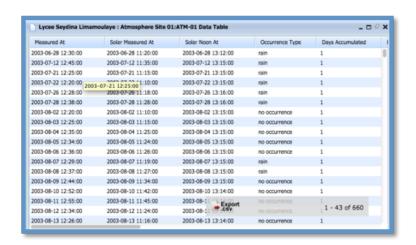
Step 8: Check to see if there is precipitation data for the same location. Chose "precipitation" from the drop down menu at the left and you will see a bar graph of the amounts of precipitation in millimeters over the same time frame that you selected in Step 7. Print the large graph or save it as a PDF file to use for your travel poster.

Note: If the school has collected other types of data they will appear in the drop down list.

(Optional) Step 9: You can download this data by clicking the icon that looks like a blue table in the upper right of the window. Click on "Export .csv" at the bottom right of the data table to download a file that will open in Microsoft Excel or other spreadsheet software. With this data in a spreadsheet program, you will be able to make graphs that you can format as you wish.

Now that you have found a location and its GLOBE data, you'll make a poster to let tourists traveling to the location know about an activity that they might like to do.

First, take a moment to consider what activity you'd suggest that tourists try in this location. Base your decision on the geography of the location and the weather data that you have from the GLOBE Visualization Tool.

As you make your tourist poster, make sure you include the following information:

Title: Create a title that tells tourist about the activity and the name of the location.

Physical Characteristics of the Place

- [ ] The range in temperatures that tourists can expect in the summer months
- [ ] The range in temperatures that tourists can expect in the winter months
- [ ] The amount of rain and snow that tourists should expect: Is there a time of year when rain and/or snow is common?
- [ ] The elevation
- [ ] Latitude and longitude
- [ ] Graphs of rainfall and temperature variation through the year (which you found with the GLOBE Visualization Tool)

Human Characteristics of the Place

- [ ] The city or town name
- [ ] The country name
- [ ] The continent name
- [ ] Photographs of the place showing the environment and the activity that you are sharing with tourists (Look for these with an online search!)
- [ ] A map of the location

Remember to cite the sources where you found the information (including images and maps) and name the GLOBE school and location.