Global Climate Change Mapping Project

Lesson Plan

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Introduction

Climate change science, not surprisingly, has long been the purview of scientists—individuals with formal training in the scientific method which includes systematic observation. In simple terms, science is about purposeful observation with the goal of determining cause/effect relationships. But the average person, not trained in science, also makes observations every day. Observation is not the exclusive domain of science. What if we could exploit the collective reality that emerges from multiple and consistent observations about the world? What if we could harness this collective power of observation about climate change through hundreds, thousands, or even millions of observations?

The Global Climate Change Mapping Project is designed to collect and display the "people's view" of climate change by offering the opportunity for *anyone* to identify environmental changes that may be due to climate change. The project is an experiment to determine what happens when you combine easy-to-use mapping technology with the global reach of the internet. The most obvious and important research question: how does the "people's view" of climate change compare with the scientific view of climate change? Where are the similarities and differences?

The more immediate value of the global climate change mapping project is educational. The website provides an opportunity for a teacher to engage students in important questions about climate change, and more indirectly, science and world geography. Some secondary educational teaching themes might include the appropriate use of technology, social (dis)equity to educational resources, and the nature of scientific inquiry. This document contains a lesson plan for use of the Global Climate Change Mapping Project as a teaching tool in the classroom.

Target level: What grade level is appropriate for using the global climate change mapping project? The lesson can be tailored to the aptitude of different groups of students. Middle and high school students should be able to do the lesson, especially answering questions that are more descriptive (e.g., how are the observations distributed?) rather than inferential in nature (e.g., why do observations occur where they do?). Some of the suggested study questions clearly involve higher-level thinking skills and would be useful in college-level courses.

Integration with curriculum: The website can be used in virtually any science-related course. However, the lesson could also be integrated into courses that involve development of critical thinking skills or the impact of technology on society.

Learning Objectives:

1) Students will be able to identify the most common environmental changes associated with global climate change. [Achieved by observing and using the different climate change map icons]

2) Students will learn basic map navigation skills. [Achieved by using the Google Maps navigation tools, i.e., cardinal direction arrows, zoom, and panning]

3) Students will learn about different map types (i.e., relief map, political map, and satellite map). [Achieved by using the different Google Maps views]

4) Students will review basic world geography—location of major continents, water bodies, and countries. [Achieved through map navigation to answer questions].

5) Students will exercise critical thinking by discovering patterns in mapped climate change observations to make inferences about potential cause/effort relationships. [Achieved by having students identify spatial clustering and dispersion of the climate observation data]

6) Students will indirectly learn the nature of scientific inquiry (systematic and often controlled observation) by contrast with non-scientific inquiry (uncontrolled observation). [Achieved by reflective thought processes in observing the climate observations with the map viewer: e.g., how do we know the climate change observations are accurate/valid?]

Class activity

Background: Inform your class that you would like them to think about observations about the place where they live or a place they have visited recently. Remind them that place consists of both the natural (e.g., forests, streams, mountains, meadows, parks, open space) and built environment (e.g. houses, buildings, roads, bridges). Of course, much of the earth is neither purely natural or built (e.g., agricultural areas). Ask whether any of the changes they have observed may be due to climate change. Note: although less obvious, even changes in the built environment may be due to climate change forces: e.g., new or reinforced levees, bridge reconstruction, building remodeling. You should provide a general definition of climate change—changes in environmental features or processes that are driven by long-term changes in weather patterns. It is helpful to remind students about the important distinction between climate and weather. Encourage students to come up with at least one observation they believe may be related to climate change. Provide some obvious examples to stimulate thinking: e.g., hotter temperatures, rising ocean levels, less winter ice, loss of wildlife, etc.

Provide students with the URL to the website the Global Climate Change Mapping Project: http://www.climatechangemap.net. The website provides the options for both entering or mapping climate observations and seeing what others around the world have mapped. Students can be instructed to identify climate change observations either *before* or *after* viewing what other have mapped. Encourage students to enter at least one or two of their own observations about climate change. The mapping process is fun and easy. Access to identify observations is through an access code. Anyone can enter observations by requesting an access code which is provided immediately by the click of a button on the main webpage. A set of access codes can be provided to any teacher that would like to specifically track the observations made by his/her students. [email request to browng@cwu.edu].

List of possible questions for students to answer:

1) Examine the distribution of climate change observations around the world. Identify 3 places in the world where the same climate change (e.g., drought) appears to "cluster"—that is, regions where the same observation is found multiple times. Describe the location by continent, country, and region within country.

2) Are the climate change observations from Question 1 related to particular physical landscape features? For example, are the observations associated with a particular physical landscape features such as mountains, plains, coastal areas, islands, rivers, etc.?

3) Which climate change observations tend to be located in the higher latitudes (toward the poles) and which tend to be located in the lower latitudes (toward the equator)?

4) Are climate change observations more concentrated in coastal areas or inland areas? Explain with a possible reason for this conclusion.

5) Find one climate change observation which doesn't appear to make any sense where it is located. Explain why the observation(s) appear out-of-place.

6) The world map can be viewed using different map views. List the different map views. Which map view is best for finding river valleys? Explain. Which map view appears best for identifying areas of low precipitation? Explain.

7) Click your mouse on a "star" icon until you find one that has a text explanation attached. What does the explanation say? Is the explanation of the climate change observation clear and understandable to you? Explain.

8) The map viewer provides different levels "zoom". Each level of "zoom" represents a different map scale. A map scale is the ratio of real world units to map units. In mapping climate change observations, do you think there is an "optimal" or "best" map scale or zoom level to record a climate change observation? Or does the best map scale depend on the particular climate change observation being mapped? Explain.

9) Which 3 countries appear to have the most observations? Give at least 2 possible explanations for why climate change observations are not evenly distributed by country.

10) The website is open to anyone in the world to map climate change observations. Describe 3 ways that this open website would influence the resulting location of observations.

Other ideas for potential class/website use.

1) Divide your class into 2 equivalent groups. Have one group go off and map their observations (i.e., to the library or computer lab) without any priming information about climate change. With one group gone, provide the other group with a short lecture on climate change, then instruct this group go map their observations. Compare and discuss the results of the two groups. This activity will measure the potential effect of your lecture on climate observations. [Note: different web access codes can be provided to track the differences in observations between groups.]

2) Hypothesis: climate change observations will differ by university class by geographic location. For example, climate observations by a class in Alaska will differ in type and location from a class in Florida. Access codes can be provided to compare your class with a class at another geographic location.

3) Statistical analysis. A "dump" of the observation database can be sent to you to have your class do statistical analysis on the data.

4) Psychological research. What the cognitive and affective processes that occur when individuals map climate change observations? How are these related to knowledge and risk perception? Questions can be asked pre-and post observation.