

Climate Classification Based on Climate Controls

Audience- GEG 101, 241, 303

Time Required: 60 Minutes

Activity: Use major WNY climate controls to identify five climate zones.

Map URL: Under Construction

Background:

Defining Climate

Weather can be defined as short term (minutes to days) variations in atmospheric conditions (temperature, rain, wind, etc.) at a given location, whereas climate can be defined as the aggregate of weather (averages and extremes), for a given location, over an extended period of time. The standard period for climate is 30 years, referred to as a 'Normal'. A simple way to separate weather and climate is to consider the aphorism "*climate is what you expect, and weather is what you get*" (attributed to Robert Anson Heinlein, an American novelist and science fiction writer), or as one of Mark Twain's student's remarked "*Climate lasts all the time and weather only a few days*".

Climate Classification

The classification of climates, like that of animals, plants, minerals, and clouds, was derived to better organize our understanding of nature's complexities. The Köppen climate classification (as developed by Wladimir Köppen) relied on the vegetation boundaries to which Köppen ascribed climatic parameters. For example, the tree line, whether north in the Arctic, or at high elevations in mountainous terrain, occurs at locations where the mean temperature of the warmest month does not exceed 50°F (10°C). Another approach to climate classification examines the effect of air masses on a region. A region influenced solely by a maritime tropical (mT) air mass (wet and hot) will experience a very different climate than a region affected by a continental polar (cP) air mass (dry and cold). Standard climate classification systems are usually defined simply by temperature and precipitation parameters. For this exercise we will consider climate controls when building our climate zones.

Please link to: <https://www.britannica.com/science/Koppen-climate-classification>
<https://www.youtube.com/watch?v=4by3NMycz7s>

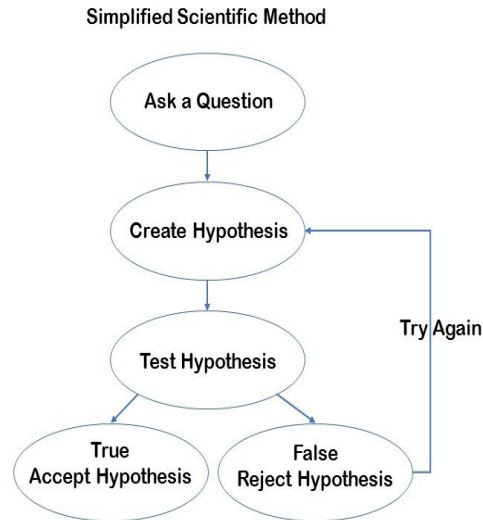
Climate Controls

The climate of a place is influenced by a number of factors, which are referred to as 'climate controls'. Examples of climate controls include: latitude (places closer to the equator would be expected to be warmer than places further away), elevation (places at higher elevations would be expected to be cooler than places at sea level), proximity to large bodies of water (lakes and oceans moderate climates), ocean currents (air passing over cold or warm currents influence the temperature of places downwind), and mountain barriers (winds passing over mountains will cool as they rise, and warm as they descend), to name but a few.

Please link to: <http://people.cas.sc.edu/carbone/modules/mods4car/ccontrol/>

The Scientific Method

Using a simplified version of the scientific method, a question is tested by posing a hypothesis (a suggested explanation). If the analyzed results agree with the hypothesis then the explanation is acceptable; if the results do not agree then one tries again with a revised hypothesis.



Engage:

- Develop a climate hypothesis for the five climate zones in WNY.
- Based on your knowledge of climate controls explain what you think the climate conditions would be in each of the five climate zones.

Task 1:

The question posed to you is *“What is the climate of WNY?”* Your first task is to answer this question by hypothesizing a comparative climatology for WNY that is based on your understanding of climate controls. The WNY climate zone base map (map 1) identifies five climate zones. These zones are based on three climate controls: elevation, proximity to the lakes (Erie and Ontario), and urban density. Overlay the climate control map (map 2) on to the climate zone map (map 1) to see how the climate zone map (map 1) was created. Based on your readings and understanding of the influence of these climate controls, provide a comparative climatology for each zone – consider seasonal and annual temperature and precipitation. For example, how might you hypothesize that the Erie coastal climate zone differs from the Southern Tier climate zone? You do not need to provide actual values, but rather a comparative climatology (warmer, colder, wetter or drier). You are to address the question asked, by providing a series of hypotheses for each climate zone which is based on the influence of climate controls. Place your answers on the Task 1 answer page.

Explore

- Test your hypothesis using the 30 year climate data for Western New York
- Explore the data by checking on the temperature and precipitation maps for the area.

Task 2:

Your second task is to test your hypotheses. Overlay, one at a time, the temperature and precipitation maps over the black & white climate control base map (map 3). For each zone, record the parameters on the Task 2 form (use the value that dominates the prescribed climate zone and/or you may need to do some general averaging) Write out a two to three page sentence that describes the climate of each zone

Evaluate

- Compare your hypothesized climates with the actual data
- Does your hypothesis hold true?

Task 3:

Compare your hypothesized climates with those driven by your data. Are the hypotheses in agreement with your data? In other words, do the climate controls provide a reasonable explanation of WNY's climate? Or, are the data results not in agreement with your hypotheses - that you either misinterpreted the impacts of a climate control or that there is another explanation for the climate of WNY? In other words, consider a revised hypothesis. Provide your answer on the Task 3 form.

Task 1 Form

Hypothesized Climate Description (based on climate controls)	
Ontario Coastal	
Niagara Frontier	
Urban	
Erie Coastal	
Southern Tier	

Task Forms: Climate Classification Based on Climate Controls

Task 2 Form

Temperature (°F)						
Climate Zone	Winter	Spring	Summer	Fall	Extreme Cold	Annual
Ontario Coastal						
Niagara Frontier						
Urban						
Erie Coastal						
Southern Tier						

Precipitation (inches)						
Climate Zone	Winter	Spring	Summer	Fall	Extreme Cold	Annual
Ontario Coastal						
Niagara Frontier						
Urban						
Erie Coastal						
Southern Tier						

Climate Description (based on data from above)	
Ontario Coastal	
Niagara Frontier	
Urban	
Erie Coastal	
Southern Tier	

Task 3 Form

Are the hypotheses in agreement with your data? In other words, do the climate controls provide a reasonable explanation of WNY’s climate? Justify your answer. What adjustments, if any, are needed to the climate zone boundaries?	
Ontario Coastal	
Niagara Frontier	
Urban	
Erie Coastal	
Southern Tier	