

# Factors that Affect Climate

# What is climate?

- **Climate** is the average weather conditions over a long period of time
  - Includes average temperatures and precipitation, wind patterns, humidity, air pressure
- **Weather** is what it is **NOW**, climate is what it **SHOULD BE**.

# How is this different from “weather”?

- Weather changes day to day.
- Weather can fall inside normal ranges or outside of what is expected from the climate- “above or below average”
- Climate is the benchmark; *what we expect*

# Climate Factors

## Temperature Factors (LADBWOC!)

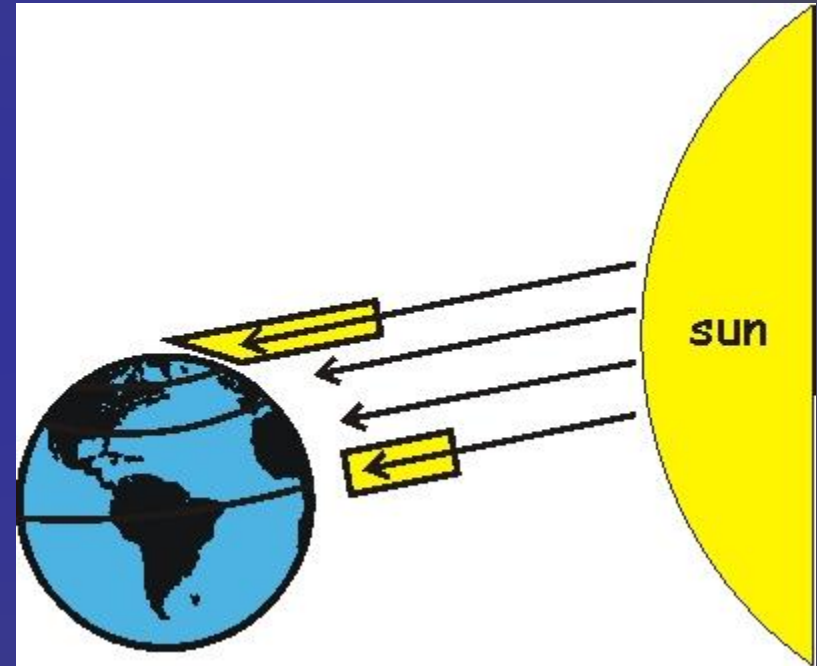
- Latitude
- Altitude
- Distance to a Body of Water
- Ocean Currents

## Precipitation Factors (TP)

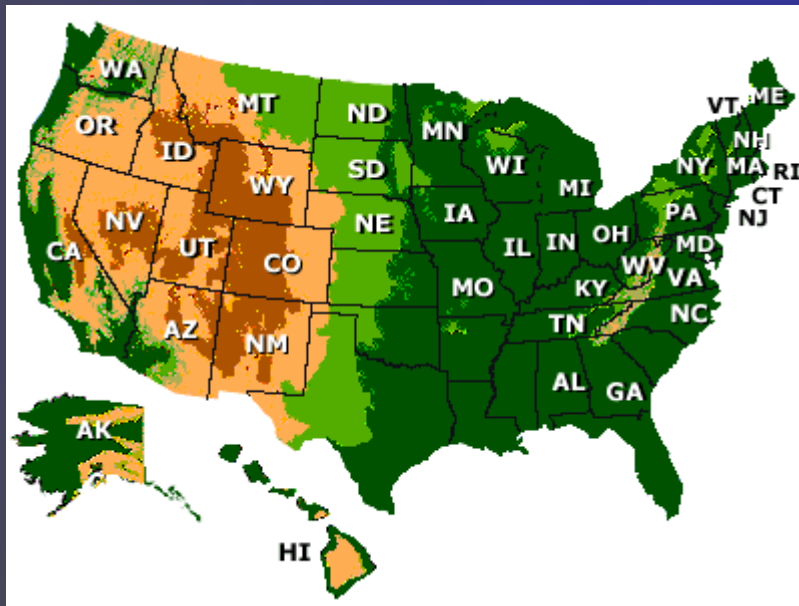
- Topography
- Prevailing Winds

# How does Latitude affect climate? *(the angular distance N or S of the equator)*

- Latitude is the most significant factor for determining climate
- Warmer at the equator
- Colder at the poles – in general
- Seasons are REVERSED between N. and S. Hemisphere



# How does Altitude affect climate?



- As you go up in altitude, you go down in temperature and sometimes precipitation

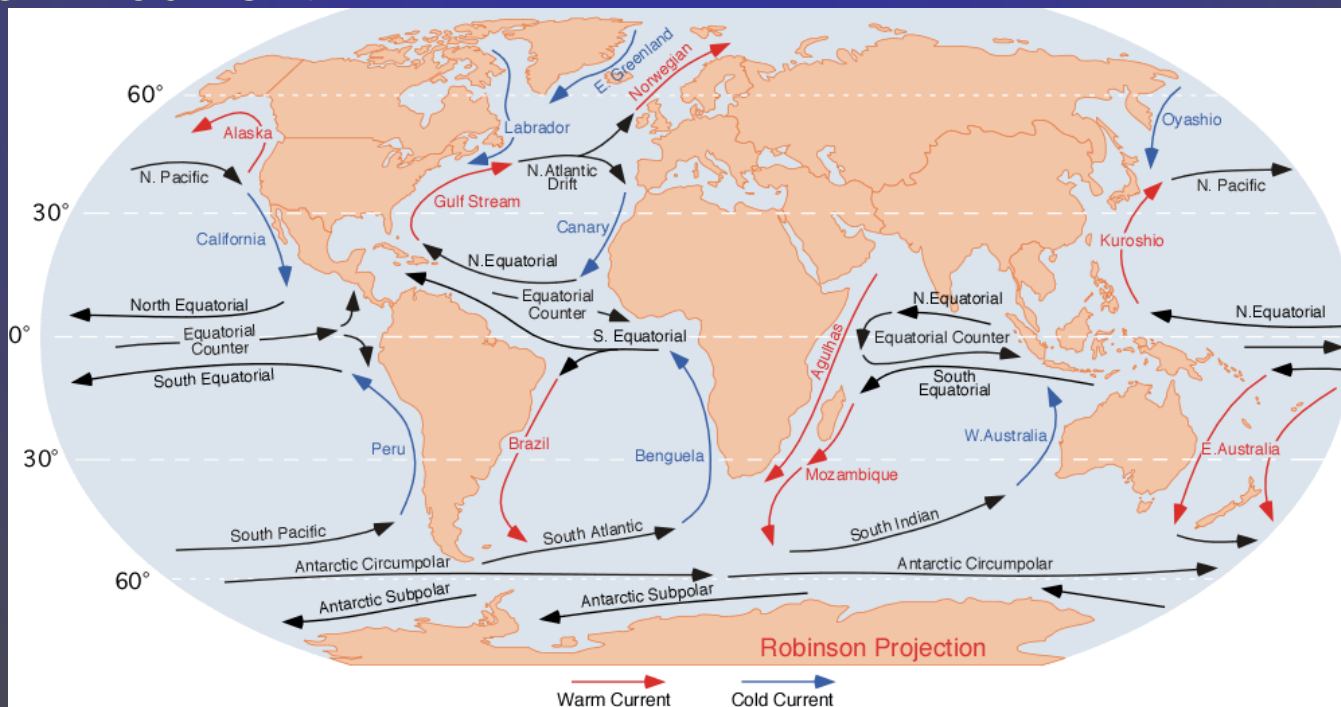
# How does the **D**istance from large **b**odies of **w**ater affect climate?



- Large bodies of water regulate temperature due to water's properties.
- The ocean thermostat- keeps it **warmer in winter and cooler in the summer**
  - less fluctuation
- Inland climate have more extreme temperature fluctuations throughout the year

# How do nearby Ocean Currents affect the climate?

- Warm and cold ocean currents bring warm moist air near to coastal areas.
- Great Britain is an example – latitude position puts it in the cold and dry climate zone
- However it is moist and warmer due to the Gulf Stream, a warm current.



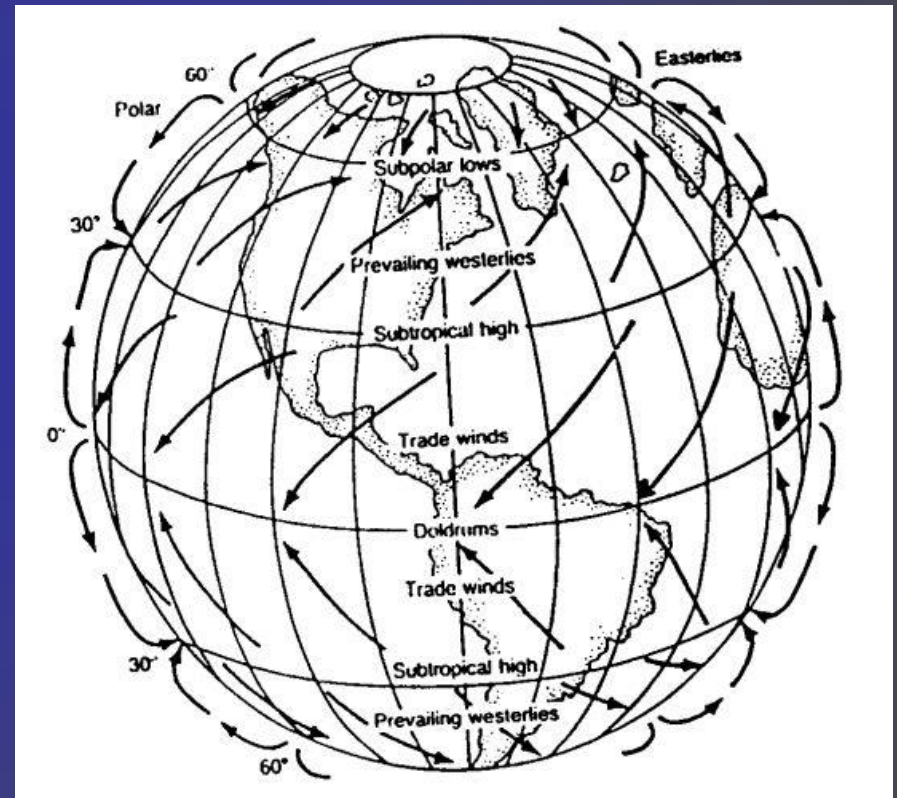


# How do the Prevailing winds

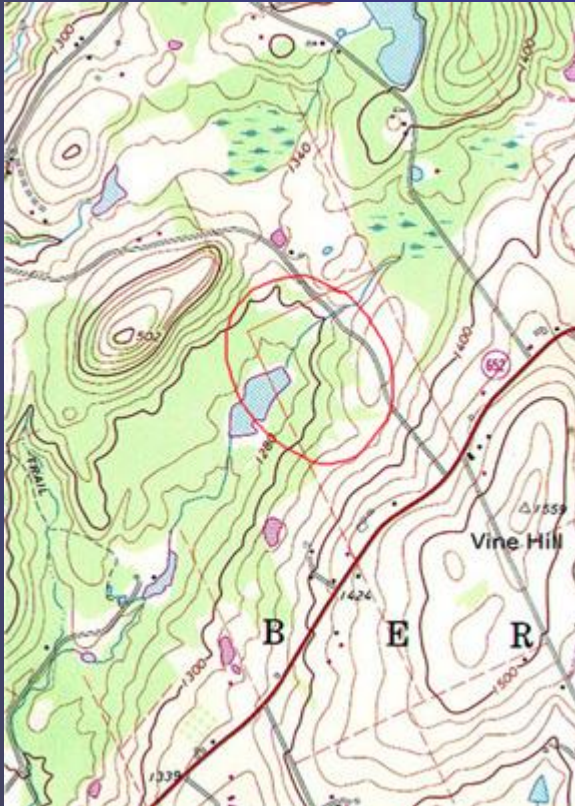
## affect climate? *Prevailing*

*winds are winds that blow predominantly from a single general direction over a particular point on the Earth's surface.*

- Global winds are generated by the rotation of the earth and move air around the globe.
- Prevailing winds (like the Trade Winds) regulate climate
- Winds bring storms, air masses of different temps.



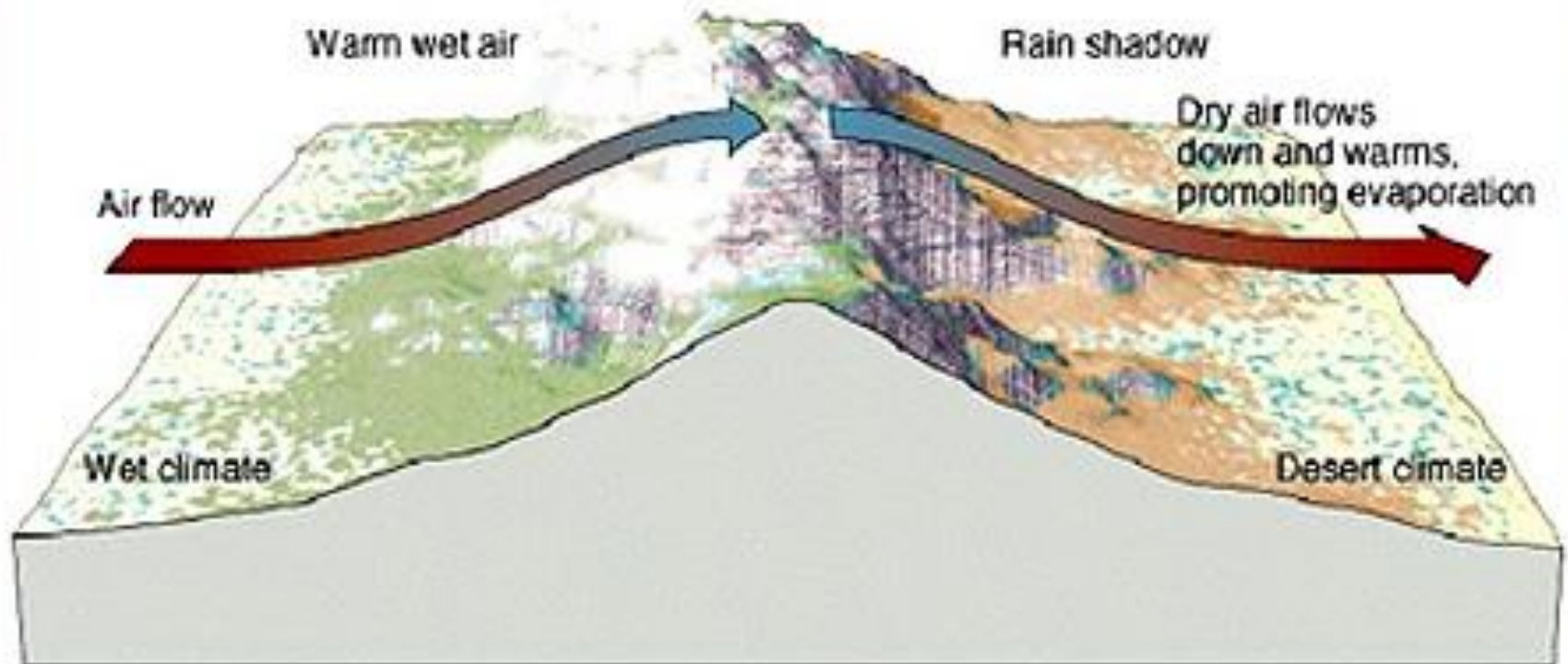
# How does Topography affect the climate?



- The lay of the ground plays an important role in regulating climate
- Ex. The **windward** side of a coastal mountain range is **wetter** than the leeward side – rain shadow effect

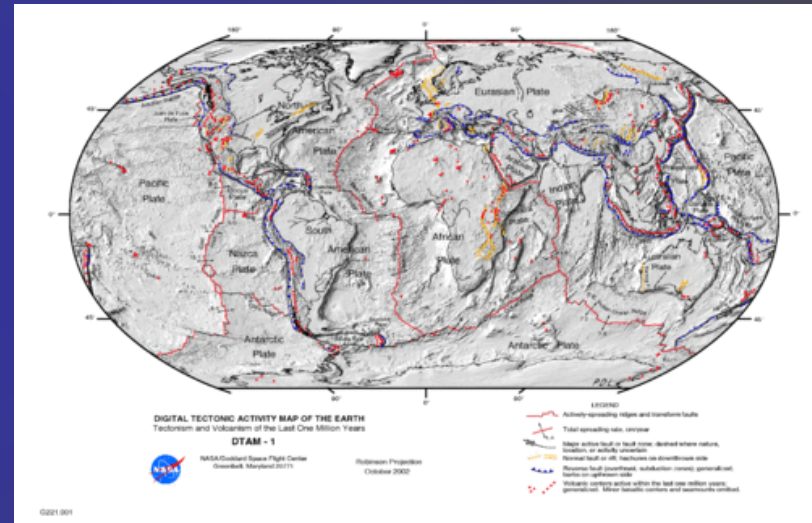
# Orographic effect - Rain Shadow

As air is forced upward over the mountains, it cools, causing water vapor to condense and rain out



# Other Factors- Plate Tectonics

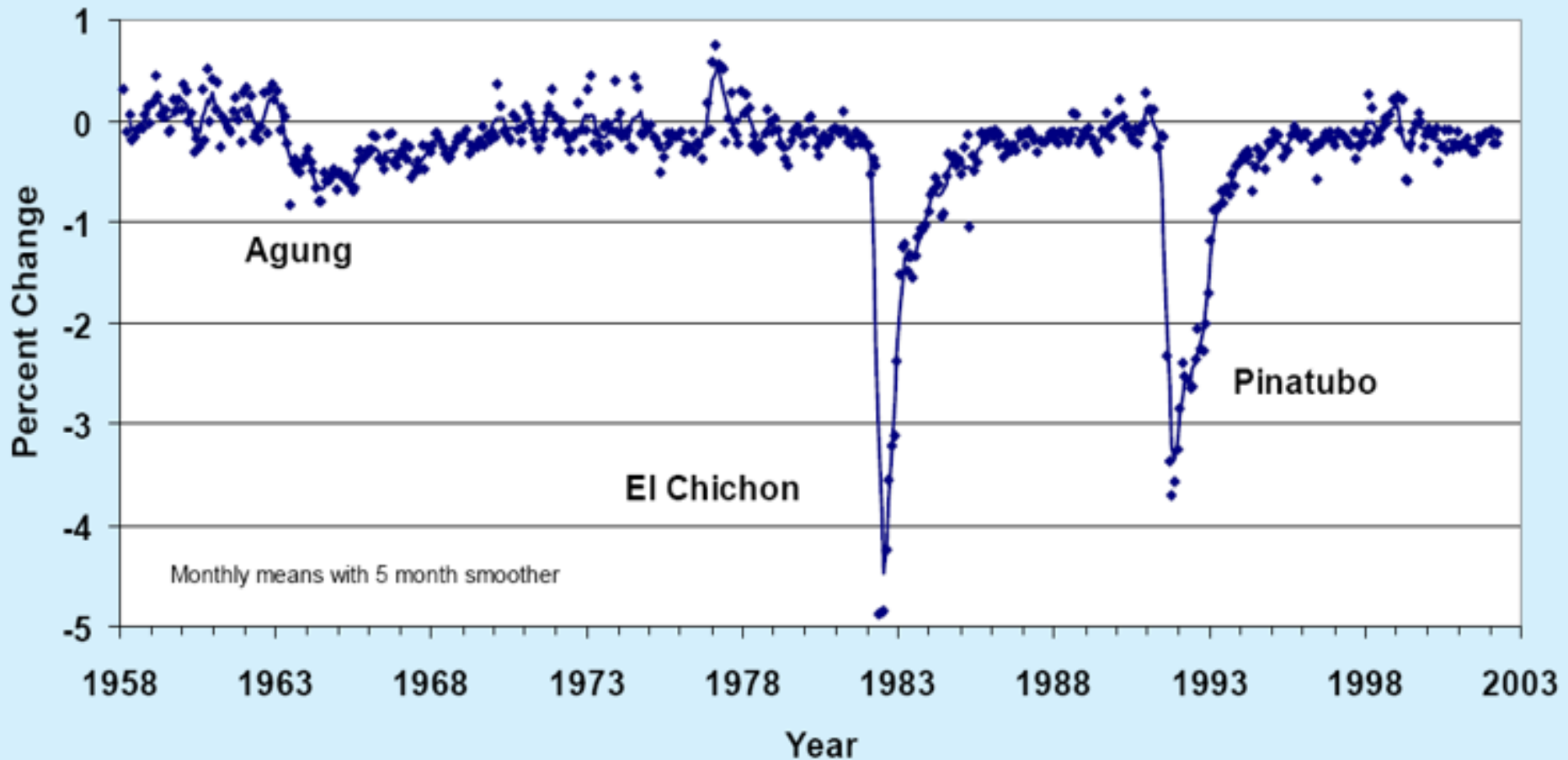
- Tectonic plates have shifted across Earth's surface for billions of years
- Greenland and Antarctica *used* to be tropical
- S. Africa had glaciers
- Most of the Western U.S. was underwater



# Other Factors- Volcanic Eruptions

- Volcanoes can warm AND cool the planet
- Volcanoes emit  $\text{CO}_2$  which is a greenhouse gas → global warming
- But volcanoes also emit  $\text{SO}_2$  and aerosols (tiny solid particles) that REFLECT sunlight back into space
  - Less radiation reaches Earth → COOLING

# % Change in Solar Radiation



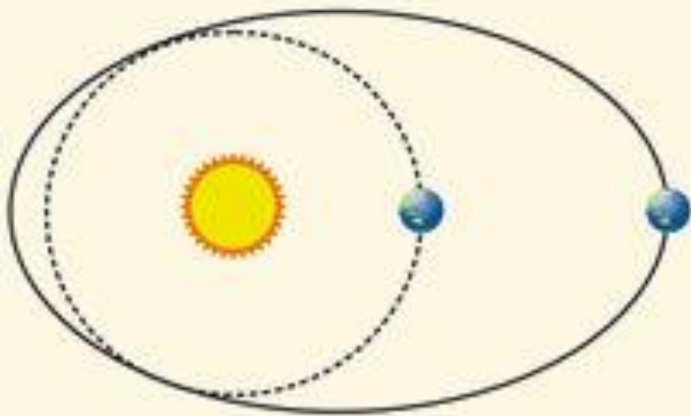
# Ice Ages

- Earth naturally **fluctuates** between ice ages and interglacial periods
- ICE AGE- an era of cooler than normal global temperatures
- INTERGLACIAL PERIOD- era of warmer than normal temps.
- Scientists claim the next ice age is 50,000 years away

# Other Factors- Astronomy

- Milankovitch Cycles: Flux in Earth's orbit and Earth's axis over long time periods

## Milankovitch Cycles



Eccentricity



Obliquity



Precession



# What We Know- Facts

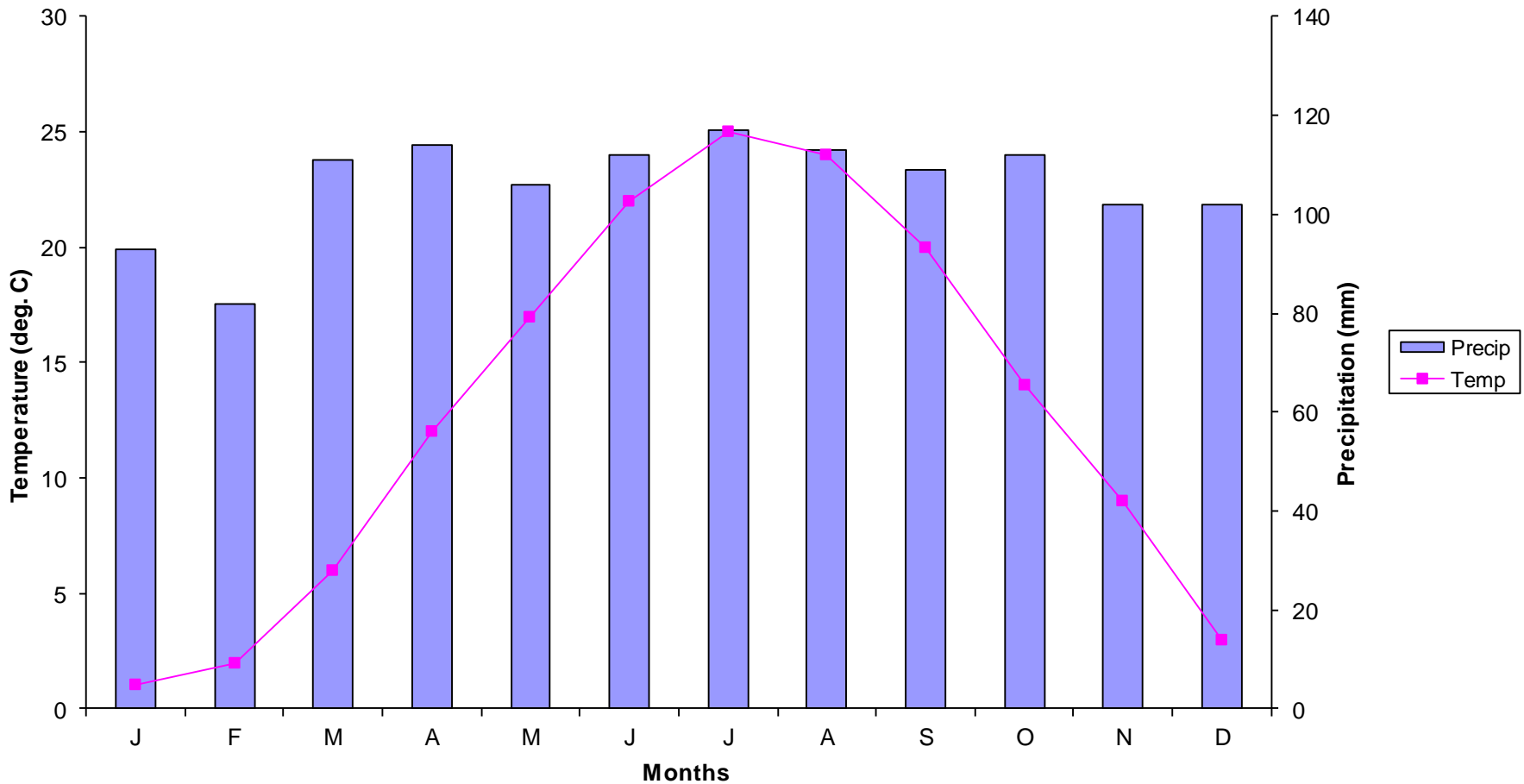
- Earth's climate HAS changed many times over time naturally
- Our climate IS changing right NOW, but it's different than ever documented before
  - WHY?????
- Humans adding GHGs has warmed the planet in the past 200 yrs → ***This is FACT***

# Looking at Climatograms

- Your group will get “pairs” of cities to compare climates
- Write down a list of observations from each graph for each city: highest temp, highest precip., trends, patterns, etc.
- Determine which climate factor is affecting the climates of these cities and provide at least 1 piece of factual evidence to support your claim.
- You can use Google maps to help locate

# Practice- NYC vs. Sydney

New York, NY



# Practice- NYC vs. Sydney

