

REMINDERS

❖ **Two required essays are due by April 17, 2020.**

➢ **A late penalty will be applied.**

✓ *A third essay may be used for extra credit in place of a "Think Geographically" essay.*

**ESSAY TOPICS (choose any two):**

- Contributions of a noted geographer, earth scientist or explorer (chapter 1)
- Relationship of climate change to a listed current event topic (ch. 2)
- Discuss a natural process that is deemed a natural hazard (ch. 3)

**IF YOU MISSED EXAM I YOU NEED TO SEE ME TO ARRANGE A DATE FOR A MAKE-UP EXAM.**

❖ **Extra Credit:** "Think Geographically" Essays from any five of the textbook's chapters 4-12.

- Last day to submit is **May 12.** but it is best to do them as you finish reading a chapter.

➢ **Any essay may be handed in before the deadline.**

➢ **Don't wait for the night before to write them!!**

**GEOG 101 Part II**  
**People and their Physical Environment**

**13: Climate and Climate Controls**

Chapter 2

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Hunter College Geography

150 YEARS  
HUNTER

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**PART II: People and their Physical Environment**

- ✓ I. Introduction to the Physical Environment
- ✓ II. Earth-Sun Relationship
- III. **Earth Systems**
  - ✓ A. The Hydrosphere: Oceans
  - **B. The Atmosphere: Weather and Climate**
  - C. The Lithosphere: Geologic Influences and Landscapes
- IV. **Earth Habitat**
  - A. Biosphere
  - B. Natural Controls and Cycles
  - C. Human Impact
  - D. Natural Hazards
  - E. Earth Resources

**CLIMATE DEFINED**

❖ **The average of all weather events at a particular location over a long period of time (50+ yrs).**

- ✓ **Climates change naturally.**
- ✓ **Climates can be altered by people.**

**CLIMATE INFLUENCES**

❖ **BOTH Earth-Sun and Earth Environment factors influence climate development.**

- latitude
- moisture
- topography
- solar energy
- wind direction
- ocean conditions

➢ **Climates influence all life on earth as well as human cultural development.**

- soil development, vegetation, biomes
- physical adaptations of animals
- culture traits of people (clothing, architecture, cuisine, sports)
- development of technology (to deal with climate)

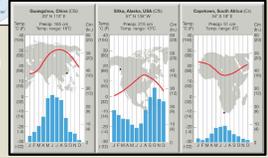
Two way street: People and their works influence climate, too!

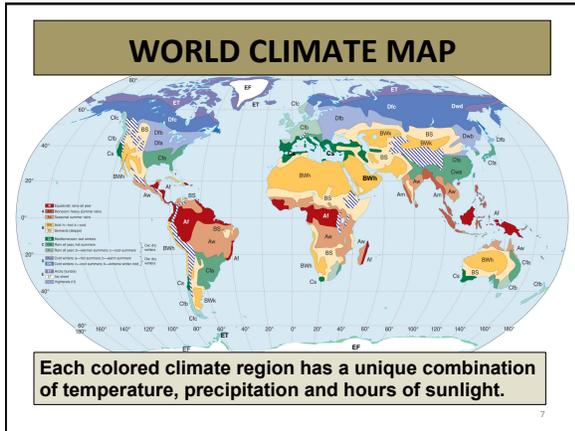
**STUDYING CLIMATE**



**Climate maps** show the geographic distribution of averaged data.

❖ **Climographs** give us a snapshot of individual locations.





### CLIMATE CLASSIFICATION

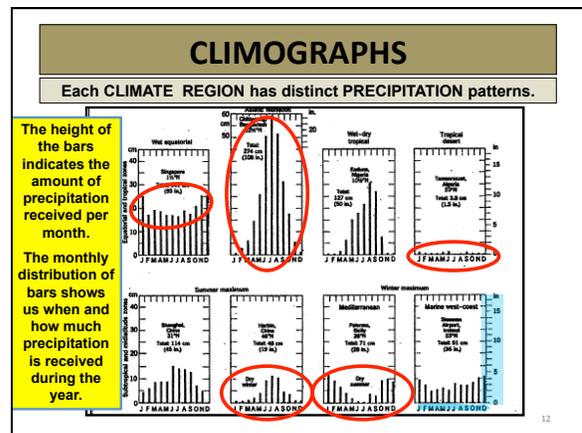
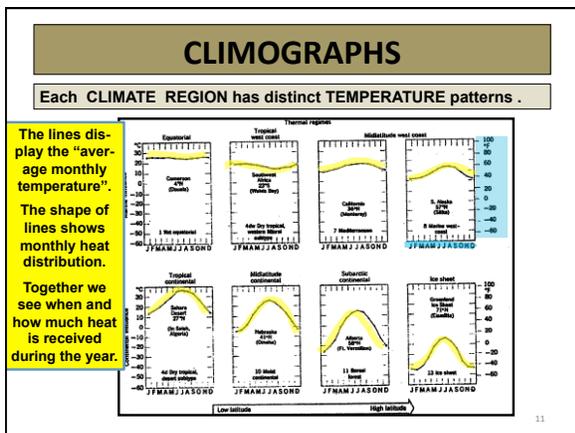
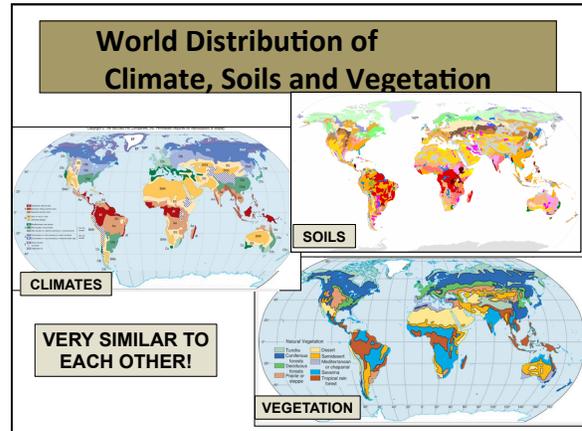
- **Four temperature-based groups:**
  - **A group:** Tropical (winterless)
  - **C group:** Subtropical (mild winter)
  - **D group:** Continental (severe winter)
  - **E group:** Polar (summerless; extremely cold)
- **One moisture deficiency-based group: B group**  
Arid and semi-arid (evapotranspiration exceeds precipitation)
- **One elevation-related group: H group**  
Highlands (vertical zonation of climate along steep slopes)

### CLIMATE GROUPS

**TABLE 2.1 in text >>**  
There are six major categories of climate. 4 are temperature based (A,C,D,E groups) 1 is moisture based (B group). 1 is elevation based (H group). Each one has a number of subcategories.

Climate Type	Climate Characteristics
<b>Tropical climates that are warm all year</b>	
<b>A</b> Humid tropical	Tropical, constantly warm and humid, with no dry season
Am	Tropical, constantly warm and humid, but with a short dry season
<b>Seasonally humid tropical</b>	
<b>Aw</b>	Tropical, constantly warm and humid, but with a pronounced dry low sun season and wet high sun season
<b>Dry climates</b>	
<b>Bwh</b>	Hot desert climate
<b>Bkn</b>	Cool desert climate
<b>Semi-arid</b>	
<b>BSh</b>	Hot semi-arid (steppe) climate
<b>BSk</b>	Cool semi-arid (steppe) climate
<b>Midlatitude climates with warm summers and cool winters</b>	
<b>Humid subtropics</b>	
<b>Cfa</b>	Humid, warm subtropical climate, with hot summers and no dry season
<b>Cfb</b>	Humid, warm subtropical climate, with hot summers and dry winters
<b>Marine west coast</b>	
<b>Cfb</b>	Marine west coast climate, with warm summers and no dry season
<b>Cfb</b>	Marine west coast climate, with cool summers and no dry season
<b>Mediterranean</b>	
<b>Csa</b>	Mediterranean climate, with dry, warm summers and cool, wet winters
<b>Midlatitude climates with warm summers and cold winters</b>	
<b>Humid continental</b>	
<b>Dfa</b>	Humid continental climate, with hot summers, cold winters, and no dry season
<b>Dfb</b>	Humid continental climate, with hot summers and dry, cold winters
<b>Dfb</b>	Humid continental climate, with warm summers, cold winters, and no dry season
<b>Dfb</b>	Humid continental climate, with warm summers and dry, cold winters
<b>Subarctic</b>	
<b>Dfb</b>	Moist subarctic climate, with cool summers, very cold winters, and no dry season
<b>Dfb</b>	Moist subarctic climate, with cool summers and very cold, dry winters
<b>Dfb</b>	Moist subarctic climate, with cool summers, frigid winters, and no dry season
<b>Dfb</b>	Moist subarctic climate, with cool summers and frigid, dry winters
<b>Polar climates</b>	
<b>ET</b>	Tundra climate, with very cool, short summers and frigid winters
<b>Icecap and ice sheets</b>	
<b>EF</b>	Ice cap climate, with temperatures consistently below freezing

Note: In mountainous areas, large differences in climate occur over short distances, causing detailed climatic patterns that cannot be shown on a world map. These areas are marked as H on this map.  
Source: Courtesy Institute for International Economics.



## CLIMOGRAPHS

Each CLIMATE REGION has distinct patterns of TEMPERATURE and PRECIPITATION

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## CLIMOGRAPHS

When temperature and precipitation patterns are combined we get a "snapshot" of that location's climate.

**Köppen Classification Symbols Key**  
 Af = Tropical rainy  
 Aw = Tropical savanna  
 Am = Tropical monsoon  
 BSh = Tropical semi-arid  
 BWh = Tropical desert  
 Cfa = Humid subtropical  
 Csa = Mediterranean dry summer  
 Cfb = Marine west-coast  
 BWk = Mid-latitude desert  
 BSk = Mid-latitude semi-arid (steppe)  
 Dfa = Humid continental hot summer  
 Dd = Subarctic  
 ET = Tundra  
 EF = Icecap

<https://www.usclimatedata.com/> : Climate info for US cities

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## Climographs and Locator Maps from your textbook

- ✓ Lines show average monthly temperature range.
- ✓ Bars show average monthly precipitation.

**A group**

**B group**

**C group**

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## Climographs and Locator Maps from your textbook

- ✓ Lines show average monthly temperature range.
- ✓ Bars show average monthly precipitation.

**C group**

**D group**

**E group**

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## Seven Natural Climate Controls

1. **Latitude** - solar energy received, zones of precipitation.
2. **Land vs. water** - different rates of warming and cooling.
3. **Ocean currents** - temperature and direction of flow.
4. **Wind direction** - global/region wind systems.
5. **Topographic barriers** - orientation and height
6. **Elevation** - lapse rate; vertical zonation
7. **Air masses** - source region and characteristics

**An 8<sup>th</sup> influence (unnatural) is the human impact.**

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## Latitude

There are parallel zones of temperature. Solar energy received varies with latitude. It is most intense in the tropics and weakest in the polar regions.

**Temperature Zones**

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### Latitude

**Zones of precipitation are parallel latitudinal (east-west) bands except for areas of tall north/south trending mountains.**

Precipitation zones move north and south with the seasons (following the vertical rays of the sun).

Air rises and sinks around the cells creating zones of precipitation

**Zones of Precipitation**

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### Land vs. Water

➤ Land (continental area) heats up and cools off more quickly than does water (marine area).

❖ **Water acts to moderate a climate**

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### Land vs. Water

**Located at the same latitude.**

**Land (continental area - Yakutsk) heats up and cools off more quickly than does water (marine area - Reykjavik).**

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### Surface Ocean Circulation

**The temperature and direction of ocean currents influences the development of climate on land.**

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### Wind Direction

**The temperature and moisture of air is moved by wind systems, both vertically (see cells) and horizontally (arrows).**

<https://www.youtube.com/watch?v=63QNz861qyk>

<https://www.e-education.psu.edu/earth111/node/732>

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### Topographic Barriers

**The orientation and height of topographic barriers influences climate development.**

- ✓ Mountains and high plateaus block the flow of wind and moisture
- ✓ Higher elevations trigger precipitation and create dry "rain shadows."

**Lower elevation north-south mountain chains have a greater effect on climate than higher elevation east-west mountain chains.**

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## Topographic Barriers

Topographic barriers create desert areas on their lee side.

**Precipitation Map**

Warm Moist Air  
Prevailing Winds  
Rising Air Cools and Condenses  
Rainy side  
Windward side  
Dry Air Advances  
Rain Shadow  
DESERT  
Lee side

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## Elevation

The elevation of land affects temperature.

- ✓ Temperature changes by 3½°F per 1000 ft of elevation (lapse rate).  
Every 5,000 ft in elevation is equal to 750 miles of latitude. Therefore it can snow at the top of high mountains in the tropics.
- ❖ Elevation creates **Vertical Zonation of Climate** along the slopes of large, high landmasses.

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## Vertical Zonation of Climate

- Temperature changes by 3½°F per 1000 ft of elevation (lapse rate).
- The greatest number of zones is found in the tropics and only one in the polar region.

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## Vertical Zonation of Climate

**Denali, Alaska (N. America)**  
Latitude 63°N; Elev. 20,320 ft.

**Killmanjaro, Tanzania (Africa)**  
Latitude 0°  
Elev. 19,340 ft.

➤ As you ascend a mountain climate characteristics and vegetation change.

- The greatest number of zones is found in the tropics
- Only one zone in the polar region.

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## Air Masses

The source region and the annual characteristics of temperature and moisture impart unique conditions to the land masses.

**Air Mass Classifications**

From T. Strahler, Physical Geography, A Landscape Approach, 4th ed. Copyright © 1992. Adapted by permission of Prentice Hall, Englewood Cliffs, New Jersey.

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## RECAP: 7 CLIMATE CONTROLS

1. **Latitude** - solar energy received, zones of precipitation
2. **Land vs. water** - different rates of warming and cooling
3. **Ocean currents** - temperature and direction of flow
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5. **Topographic barriers** - orientation and height
6. **Elevation** - lapse rate; vertical zonation
7. **Air masses** - source region and characteristics

<http://wps.prenhall.com/wps/media/objects/616/631756/abcontrol/pages/question.html>

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