

REMINDERS

❖ Two required essays are due by **March 27, 2018**. (A third 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)

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

- Last day to submit is **May 15** but it is best to do them as you finish reading a chapter.

- Any essay may be submitted 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

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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
- IV. **Earth Habitat**
 - A. Biosphere
 - B. Natural Controls and Cycles
 - C. Human Impact
 - D. Natural Hazards

CLIMATE

❖ **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

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

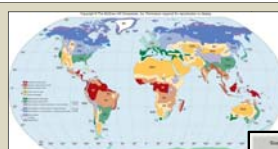
- latitude
- solar energy
- moisture
- wind direction
- topography
- ocean conditions

➤ **Climates influence all life and human culture on earth.**

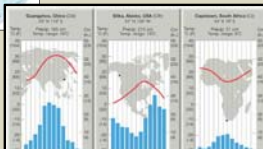
- soil development, vegetation, biomes
- physical adaptations of animals
- culture traits of people (clothing, architecture, cuisine)
- development of technology (to deal with climate)

People and their works influence climate, too!

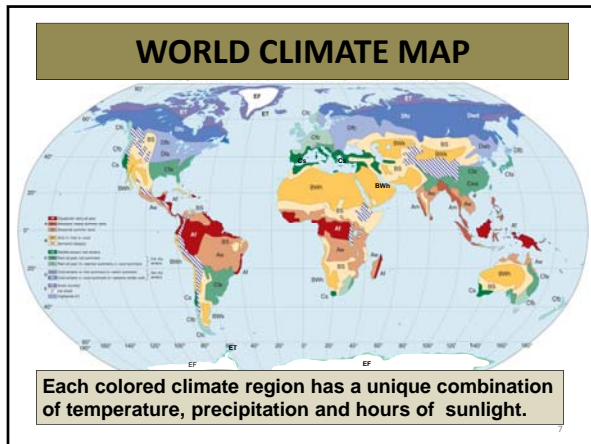
STUDYING CLIMATE



Climate maps show the geographic distribution of averaged data.



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

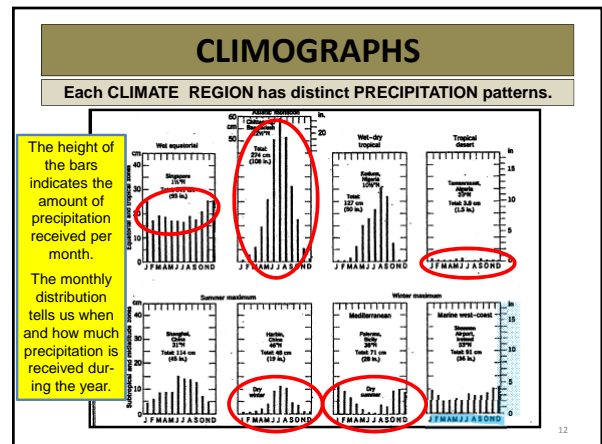
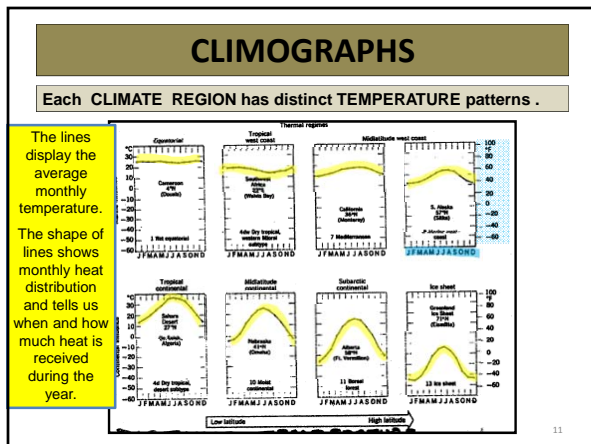
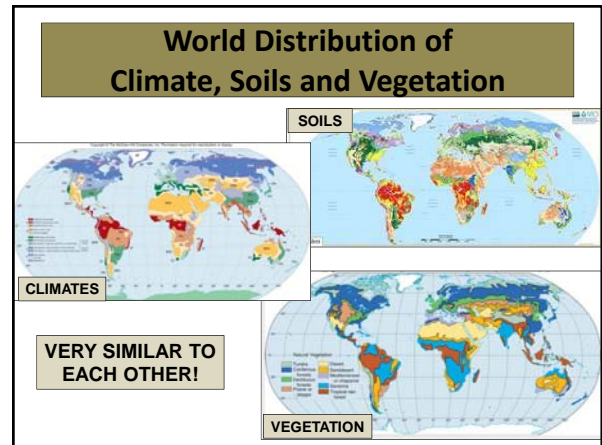


- ## CLIMATE CLASSIFICATION
- **Four temperature-based groups:**
 - **A group:** Tropical (winterless)
 - **C group:** Subtropical (mild winter)
 - **D group:** Continental (severe winter)
 - **E group:** Polar (summerless; extremely cold)
 - **One moisture deficiency-based group: B group**
Arid and 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 has a number of subcategories.

Climate Type	Climate Characteristics
Tropical climates that are warm all year	
Af (Tropical)	Tropical, constantly warm and humid, with no dry season
Am (Seasonally humid tropical)	Tropical, constantly warm and humid, but with a short dry season
Aw (Seasonally arid)	Tropical, constantly warm and humid, but with a pronounced dry low-rain season and wet high-rain season
Dry climates	
BWh (Hot desert)	Hot desert climate
BWk (Cold desert)	Cold desert climate
BSh (Hot semi-arid)	Hot semi-arid (stepped) climate
BSk (Cold semi-arid)	Cold semi-arid (stepped) climate
Midlatitude climates with warm summers and cool winters	
Cfa (Humid subtropical)	Humid, warm subtropical climate, with hot summers and no dry season
Cwa (Marine west coast)	Humid, warm subtropical climate, with hot summers and dry winters
Cfb (Marine west coast)	Marine west coast climate, with warm summers and no dry season
Cfc (Marine west coast)	Marine west coast climate, with cool summers and no dry season
Csa (Mediterranean)	Mediterranean climate, with dry, warm summers and cool, wet winters
Midlatitude climates with warm summers and cool winters	
Dfa (Humid continental)	Humid continental climate, with hot summers, cold winters, and no dry season
Dwa (Humid continental)	Humid continental climate, with hot summers and dry, cold winters
Dwb (Humid continental)	Humid continental climate, with warm summers, cool winters, and no dry season
Dwb (Subarctic)	Humid continental climate, with warm summers and dry, cold winters
Dfb (Subarctic)	Moist subarctic climate, with cool summers, very cold winters, and no dry season
Dfb (Subarctic)	Moist subarctic climate, with cool summers and very cold, dry winters
Dfb (Subarctic)	Moist subarctic climate, with cool summers, light winters, and no dry season
Dfb (Subarctic)	Moist subarctic climate, with cool summers and light, dry winters
Polar climates	
ET (Tundra)	Tundra climate, with very cool, short summers and light winters
Ice cap and ice sheets	
EF	Ice cap climate, with temperatures consistently below freezing



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
 Cs = Mediterranean dry summer
 Cfb = Marine west-coast
 BWk = Mid-latitude desert (steppe)
 BSk = Mid-latitude semi-arid (steppe)
 Dfa = Humid continental hot summer
 Dd = Subarctic
 ET = Tundra
 EF = Icecap

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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 and region wind systems
5. **Topographic barriers** - orientation and height
6. **Elevation** - lapse rate; vertical zonation
7. **Air masses** - source region and characteristics

An 8th influence (unnatural) is the human impact.

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

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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).

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Topographic Barriers

The orientation and height of topographic barriers influences climate development.


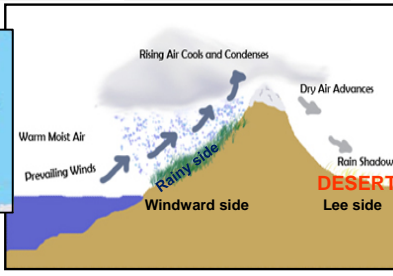
- ✓ They block the flow of wind and moisture
- ✓ Higher elevations trigger precipitation and create dry "rain shadows."

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.

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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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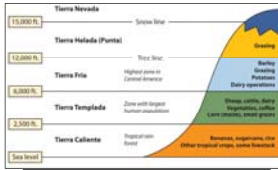
Vertical Zonation of Climate



- 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



Kilimanjaro, Tanzania (Africa)
Latitude 0°; Elev. 19,340 ft.

E
D
C
A




➤ 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.

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

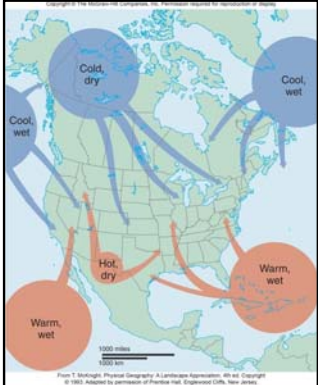
EF
ET



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Air Masses

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

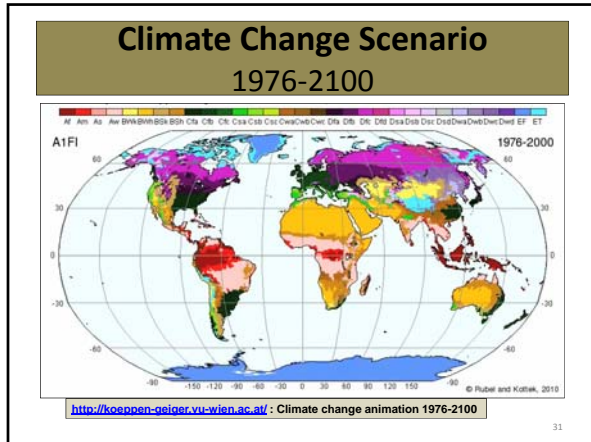


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RECAP: 7 CLIMATE CONTROLS

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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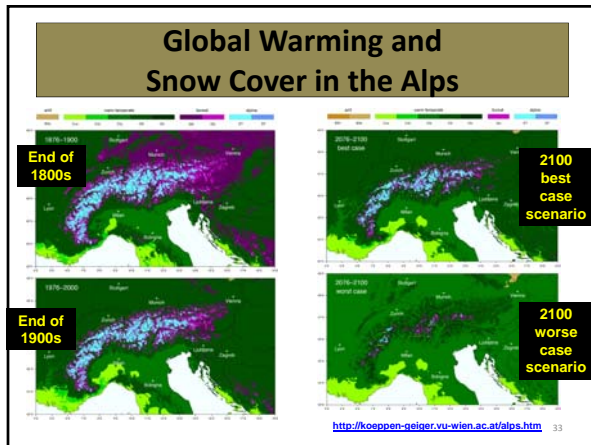
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Human-influenced Climate Change: Sea Levels

- ❖ We will talk about human impact in a couple of weeks including the **Green House Effect** and its relationship to global climate change. Here are 2 scenarios focusing on a warming earth.
 - What happens if the Earth Warms 1°-2°C?
<https://www.youtube.com/watch?v=9GjRS8QbHmY>
 - What if all the ice on Earth melted what would the continents look like?
https://www.youtube.com/watch?v=VbiRNT_gWUQ

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Extra Credit for Exam II

Extra credit atlas exercise for EXAM II will focus on climate and climate controls.

It will be available on the **Course Home Page**.

Submit answers on blue Scantron sheet no later than **Wednesday, April 11, 2018. This is a Fri. sched at CUNY**

Remember to bubble-in your name on the back of the sheet.

EXAM II Tuesday April 17 (tentative) not April 13.

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NEXT

The Lithosphere: Geologic Influences

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