

Name: _____

Weather, Climate and Society – ATMO336

Third Exam April 20, 2000

Section 1. True/False (5 pts each)

- ___ The ocean's moderating influence on climate exists because it takes a great deal more heat to raise the temperature of 1 gram of water 1°C than it does to raise the temperature of 1 gram of soil or rock by 1°C.
- ___ Latitude is an important climatic attribute because of the effect it has on the amount of solar radiation reaching the Earth's surface.
- ___ During the Little Ice Age continental glaciers covered large portions of North America.
- ___ The underlying cause of the general circulation is the unequal heating of the earth's surface.
- ___ Milutin Milankovitch, a Serbian scientist, believed that positive feedback mechanisms were the cause of the ice Ages.
- ___ Upwelling along the Peruvian coast results in cold ocean temperatures and enhanced nutrients near the ocean surface.
- ___ El Niño is the name given to the occasional development of cold ocean surface waters along the coast of Ecuador and Peru.
- ___ A positive feedback mechanism acts to weaken or oppose an initial change.
- ___ During the last Ice Age, the Sahara desert region had a much wetter climate than today.
- ___ The development of hominid bipedalism occurred during the Pliocene, 1.6–5.3 million yrs BP.

Section 2. Multiple choice questions (5 pts each)

1. The angle of incidence between the sun's rays and the surface of the earth varies with ____.
 - (a) surface elevation
 - (b) distance from the ocean
 - (c) earth's rotation rate
 - (d) latitude
 - (e) all of the above

2. In the Northern Hemisphere, ocean currents in the Atlantic and the Pacific move in a generally circular pattern. The direction of this motion is ____ in the Atlantic and ____ in the Pacific.
- (a) clockwise, counterclockwise
 - (b) clockwise, clockwise
 - (c) counterclockwise, counterclockwise
 - (d) counterclockwise, clockwise
3. The Northeast and Southeast trade winds are found:
- (a) between 30°S and 30°N
 - (b) around the polar regions on each hemisphere
 - (c) east of large continents
 - (d) over the North Atlantic and Pacific Oceans
4. The Viking colonies in Greenland were established during:
- (a) the medieval optimum
 - (b) the Pleistocene epoch
 - (c) the Little Ice Age
 - (d) the climatic optimum
5. Which of the following is not a correct statements to explain the urban heat island effect:
- (a) urban surfaces have reduced evaporation
 - (b) urban surfaces generally absorb a higher percentage of incoming solar radiation
 - (c) the geometry of city buildings causes the reflection of a greater quantity of incoming solar radiation
 - (d) urban surfaces have greater heat conduction and more heat storage
 - (e) none of the above – they are all correct

The following climatic periods refer to the next two questions:

- (a) Little Ice Age
 - (b) Medieval optimum
 - (c) Twentieth Century
 - (d) Holocene optimum
 - (e) Younger Dryas event
 - (f) Last major glacial period
6. What is the correct time sequence (from earliest to most recent) of the climatic periods above:
- (a) f, e, d, b, a, c
 - (b) f, e, d, a, b, c
 - (c) a, e, d, f, b, c
 - (d) a, f, d, b, e, c
 - (e) none of the above

7. The climate periods above can be classified as warmer or colder than the climate of the last 10,000 years in the following manner:
- (a) a: cold; b: cold; c: warm; d: warm; e: cold; f: cold
 - (b) a: cold; b: cold; c: warm; d: cold; e: warm; f: cold
 - (c) a: cold; b: warm; c: warm; d: warm; e: cold; f: cold
 - (d) a: cold; b: warm; c: cold; d: warm; e: warm; f: cold
8. A drop in the number of lightning deaths, from about 6 deaths per million people in 1903 to 0.5 deaths per million at present, has been attributed to:
- (a) climate changes resulting in more intra-cloud and less cloud-to-ground lightning
 - (b) a shift in population from rural to urban settings
 - (c) more widespread use of buried power distribution lines
 - (d) use of small rockets to artificially trigger and release electric stress in thunderstorms
9. If the earth were in a cooling trend, which of the following would most likely act as a positive feedback mechanism?
- (a) increasing the water vapor content in the air
 - (b) increasing the carbon dioxide content in the air
 - (c) decreasing the amount of cloud cover around the globe
 - (d) increasing snow cover around the earth
10. A rainshadow desert is normally found:
- (a) in polar regions where the air is cold and dry
 - (b) in the center of the ITCZ
 - (c) on the downwind side of a mountain range
 - (d) on the back (western) side of a large thunderstorm

Section 3. Short Answer (15 pts each)

Please answer only 4 of the following 5 questions. If you answer all four, I will eliminate one question at random! Use extra blank pages provided.

1. Name one possible cause of long-period climatic variations in each of the following categories:
 - (a) astronomical changes
 - (b) atmospheric composition changes
 - (c) Earth's surface changes
2. Explain why paleoclimate research is important in evaluating potential climates of the future.
3. List two examples of historical documents and two examples of environmental processes that can contain information about past climates.

4. Explain how changes in climate allowed the ancestors of American Indians to walk across the Bering Strait linking Alaska and Siberia.
5. Explain how a change to a drier climate, which replaced forests regions with Savannah conditions, could have forced early hominids to walk upright.

Answer Key for Exam A

Section 1. True/False (5 pts each)

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- True Latitude is an important climatic attribute because of the effect it has on the amount of solar radiation reaching the Earth's surface.
- False During the Little Ice Age continental glaciers covered large portions of North America.
- True The underlying cause of the general circulation is the unequal heating of the earth's surface.
- False Milutin Milankovitch, a Serbian scientist, believed that positive feedback mechanisms were the cause of the ice Ages.
- True Upwelling along the Peruvian coast results in cold ocean temperatures and enhanced nutrients near the ocean surface.
- False El Niño is the name given to the occasional development of cold ocean surface waters along the coast of Ecuador and Peru.
- False A positive feedback mechanism acts to weaken or oppose an initial change.
- True During the last Ice Age, the Sahara desert region had a much wetter climate than today.
- True The development of hominid bipedalism occurred during the Pliocene, 1.6–5.3 million yrs BP.

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