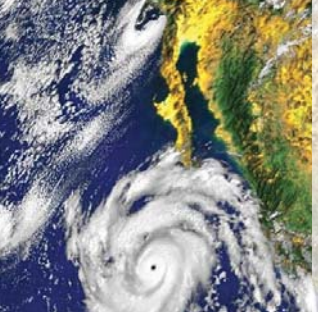
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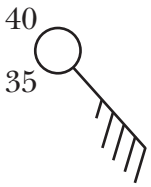
CHAPTER 2
Spatial representations of weather data

Weather station model

2.1. Create the station model for an overcast day with an easterly wind of 30 knots and temperature of 55°F.

2.2. In the station model, a black triangle among the wind barbs indicates:

(A) 1 knot
(B) 5 knots
(C) 10 knots
(D) 50 knots
(E) 100 knots



2.3. The wind direction reported by the above weather station is:

(A) Northerly.
(B) Northwesterly.
(C) Westerly.
(D) Southwesterly.
(E) Southerly.
(F) Southeasterly.
(G) Easterly.
(H) Northeasterly.

2.4. The wind speed reported by the above weather station is:

(A) 4.5 knots.
(B) 35 knots.
(C) 40 knots.
(D) 45 knots.
(E) 50 knots.
(F) 55 knots.
(G) 60 knots.
(H) 65 knots.

2.5. The cloud cover reported by the above weather station is:

(A) Overcast.
(B) Very cloudy.
(C) Cloudy.
(D) Partially cloudy.
(E) Clear.
(F) No visibility.

Temperature maps

2.6. A region where the temperature changes sharply on a short distance is called:

(A) A temperature front.
(B) A temperature boundary.
(C) An isotherm.
(D) A temperature gradient.
(E) A temperature inversion

2.7. A cold front is:

(A) A region of the atmosphere where it snows because it is very cold.
(B) A region of the atmosphere where a cold air mass moves into a warm air mass.
(C) A very cold air mass.
(D) An air mass in which the temperature decreases with height.
(E) A layer of the atmosphere where the temperature is unusually low.

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Radar

2.8. Which of the following statements about standard weather radars is NOT true?

(A) They can detect migrating birds.
(B) They are blocked by mountains.
(C) They can detect hailstones.
(D) They can detect clouds.
(E) They can determine the intensity of precipitation.

2.9. Precipitation measurements by radar are based on:

(A) The reflection of microwave radiation by rain drops.
(B) The emission of infrared radiation by rain drops.
(C) The reflection of visible sunlight by rain drops.
(D) The temperature and altitude of rain drops.
(E) The number and size of aerosols on which rain drops are forming.

Satellite imagery

2.10. Infrared satellite images are obtained by:

(A) Measuring the visible radiation reflected by Earth.
(B) Measuring the infrared radiation reflected by Earth.
(C) Measuring the heat reflected by Earth.
(D) Measuring the visible radiation emitted by Earth.
(E) Measuring the infrared radiation emitted by Earth.
(F) Measuring the heat emitted by Earth.

2.11. In an infrared satellite image, high clouds are shown as _____ because they are _____.

(A) dark, warm
(B) white, warm
(C) dark, cold
(D) white, cold

2.12. Explain why a cloud might appear white on a visible satellite image and dark on an infrared image?

2.13. Which of the marked regions in the infrared satellite image below corresponds to low clouds?

(A) Region A
(B) Region B
(C) Region C
(D) Region D

2.14. When a cloud appears white in an infrared image, we know that:

(A) It emits a lot of visible radiation.
(B) It absorbs a lot of visible radiation.
(C) It is at a higher temperature than a gray cloud.
(D) The cloud top is colder and therefore higher in the atmosphere.
(E) The cloud is lower in the atmosphere and therefore warmer.

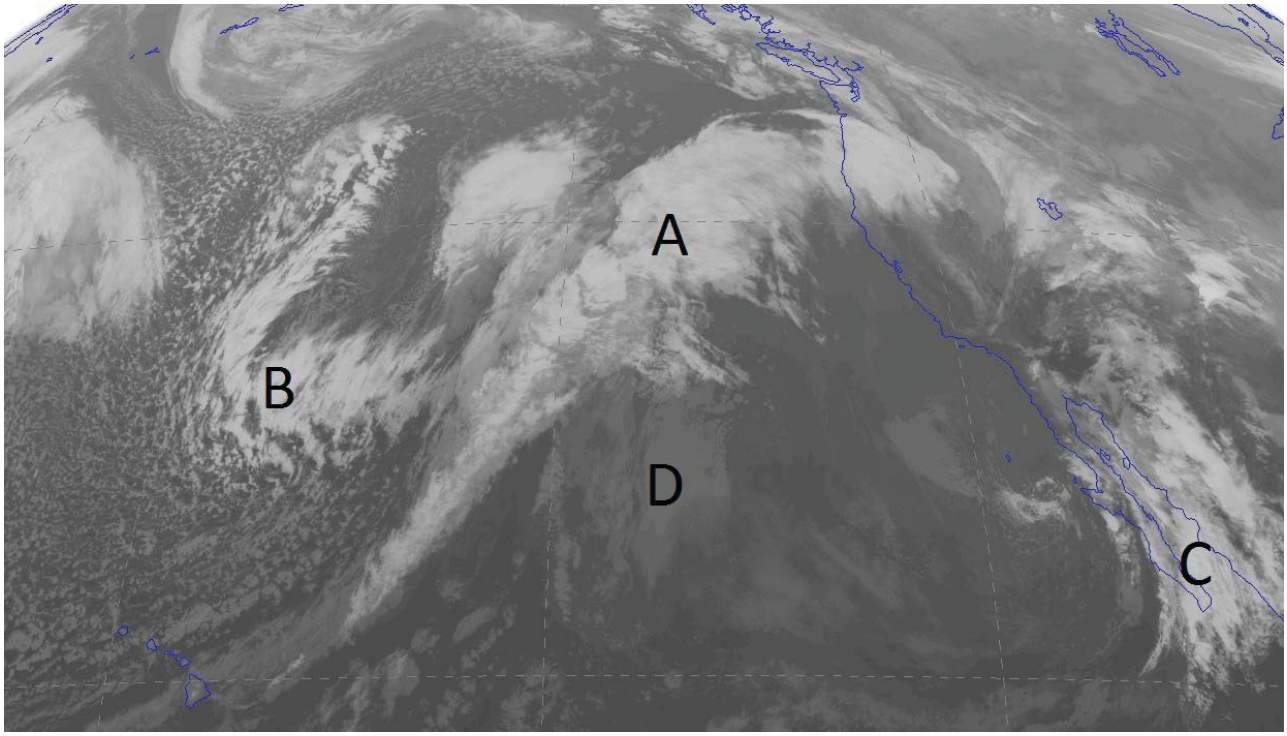
2.15. The speed of rotation of a geostationary satellite is:

(A) 36,000 km/hr
(B) 36,000 km/day
(C) 36,000 knots/day
(D) 36,000 km/revolution
(E) 1 revolution/day

2.16. Geostationary satellites:

(A) Orbit Earth over the poles.
(B) Orbit Earth at a distance where the magnitude of the centrifugal force is zero.
(C) Are stationary over a fixed point on Earth.
(D) Only monitor stationary weather systems.
(E) Are positioned at an altitude of 360 kilometers above Earth's surface.

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2.17. Which is true about geostationary satellites?

(A) They are stationary in space while Earth rotates underneath, which allows them to view the entire globe.
(B) They are stationary with respect to Earth and always observe the same location.
(C) They orbit Earth at a distance where the magnitude of the gravitational pull is zero.
(D) The satellites are stationary in space over the poles, which allows them to view an entire hemisphere.
(E) The orbit is stationary and therefore the satellites always stay at the same altitude.
(F) The satellites are at an altitude where they do not disrupt Earth's rotation, so that Earth remains stationary.

2.18. Describe the difference(s) between geostationary and polar-orbiting satellites.

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CHAPTER 3

Origin and composition

Composition of the atmosphere

3.1. For each of the questions below, choose among the following list of gases:

(A) Oxygen
(B) Nitrogen
(C) Hydrogen
(D) Carbon dioxide
(E) Water vapor
(F) Ozone

3.1.1. Which gas has seen its concentration increase drastically over the last 200 years?

3.1.2. Which gas is produced by photosynthesis?

3.1.3. Which gas is found mostly in the stratosphere?

3.1.4. Which gas is the most explosive?

3.1.5. Which gas is found in the bubbles that form when you boil water?

3.1.6. Which gas is found in highest concentration in the atmosphere?

3.1.7. Which gas is destroyed by CFCs?

3.1.8. Which are permanent gases?

3.1.9. Which are variable gases?

3.2. The percentages of oxygen (O_2) and nitrogen (N_2) in the atmosphere are:

(A) 12% O_2 and 88% N_2
(B) 21% O_2 and 78% N_2
(C) 28% O_2 and 71% N_2
(D) 71% O_2 and 28% N_2
(E) 78% O_2 and 21% N_2
(F) 88% O_2 and 12% N_2

3.3. The most abundant gas in Earth's atmosphere is:

(A) Nitrogen.
(B) Oxygen.
(C) Argon.
(D) Carbon dioxide.
(E) Water vapor.

3.4. Order the following gases from most abundant to least abundant in Earth's atmosphere.

(A) Argon, nitrogen, oxygen.
(B) Oxygen, argon, nitrogen.
(C) Argon, oxygen, nitrogen.
(D) Nitrogen, argon, oxygen.
(E) Nitrogen, oxygen, argon.

3.5. Water vapor is:

(A) A gas.
(B) Another name for mist.
(C) Another name for fog.
(D) Very small liquid water droplets.
(E) Very small ice crystals.

3.6. Which is a permanent gas:

(A) Water vapor.
(B) Carbon dioxide.
(C) Oxygen.
(D) Ozone.
(E) Methane.

3.7. Which is a variable gas:

(A) Water vapor.
(B) Nitrogen.
(C) Oxygen.

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