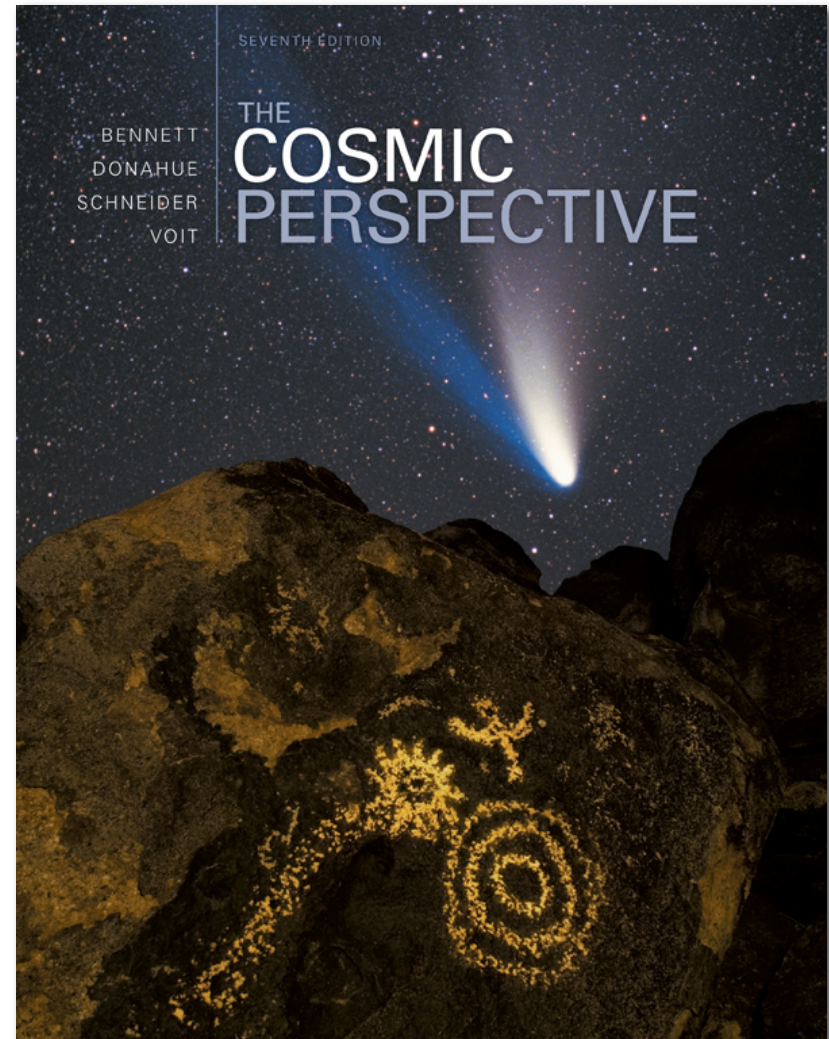


The Cosmic Perspective

Seventh Edition

Planetary Atmospheres: Earth and the Other Terrestrial Worlds



10.1 Atmospheric Basics

- What is an atmosphere?
- How does the greenhouse effect warm a planet?
- Why do atmospheric properties vary with altitude?

Which lists the planets in order of increasing atmospheric surface pressure?

- a) Mars, Venus, Earth
- b) Mars, Earth, Venus
- c) Earth, Venus, Mars
- d) Earth, Mars, Venus
- e) none of the above

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Why does atmospheric pressure decrease with altitude?

- a) The weight of the atmosphere above decreases as altitude increases.
- b) The temperature of the atmosphere decreases.
- c) The temperature of the atmosphere increases.
- d) The molecules in the upper atmosphere are lighter.

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How does the greenhouse effect work?

- a) Greenhouse gases reflect light that reflects off the surface back toward the surface.
- b) Greenhouse gases absorb light that reflects off the surface.
- c) Greenhouse gases reflect thermal radiation that is emitted by the surface.
- d) Greenhouse gases absorb thermal radiation that is emitted by the surface.
- e) Greenhouse gases prevent convection, trapping heat near the surface.

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Which of the following is *not* a greenhouse gas?

- a) water vapor (H_2O)
- b) carbon dioxide (CO_2)
- c) ozone (O_3)
- d) methane (CH_4)

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10.2 Weather and Climate

- What creates wind and weather?
- What factors can cause long-term climate change?
- How does a planet gain or lose atmospheric gases?

What heats the stratosphere?

- a) ultraviolet light
- b) X-rays
- c) thermal radiation (infrared light)
- d) convection from the troposphere
- e) A and B

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Why is the sky blue?

- a) Air molecules absorb red light and reflect blue light.
- b) Air molecules absorb all wavelengths of light and emit blue light.
- c) Air molecules scatter blue light more than they scatter red light.
- d) The atmosphere is reflecting the blue color of the oceans.

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How does the Coriolis effect affect the circulation of a hurricane (low pressure system) in the northern hemisphere?

- a) It causes inflowing air to deviate to the right, resulting in counterclockwise rotation.
- b) It causes inflowing air to deviate to the right, resulting in clockwise rotation.
- c) It causes inflowing air to deviate to the left, resulting in counterclockwise rotation.
- d) It causes inflowing air to deviate to the left, resulting in clockwise rotation.
- e) The Coriolis effect has no effect on the circulation of a hurricane.

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Which of the following is *not* a factor in producing long-term climate change?

- a) The brightness of the Sun slowly changes.
- b) The distances of the planets from the Sun slowly change.
- c) The axis tilts of planets slowly change.
- d) The abundance of greenhouse gas in the atmosphere changes.
- e) The reflectivity of a planet may change.

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What is the primary source of gas for thick terrestrial planet atmospheres?

- a) evaporation and sublimation from surface ices and liquids
- b) impacts on the surface by the solar wind
- c) meteoroid impacts on the surface
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Which of the following increases atmospheric loss by thermal escape?

- a) increasing the mass of the gas particles
- b) increasing the temperature of the atmosphere
- c) increasing the escape velocity of the planet
- d) all of the above

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10.3 Atmospheres of the Moon and Mercury

- Do the Moon and Mercury have any atmosphere?

What is the source of the exospheres of the Moon and Mercury?

- a) evaporation and sublimation from surface ices and liquids
- b) impacts on the surface by solar wind particles
- c) meteoroid impacts on the surface
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- e) B and C

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10.4 Atmospheric History of Mars

- What is Mars like today?
- Why did Mars change?

How do seasons on Mars differ from seasons on Earth?

- a) They are less extreme because of Mars's smaller axis tilt.
- b) They are more extreme because of Mars's greater axis tilt.
- c) They are less extreme because of Mars's larger orbit.
- d) They are more extreme because of Mars's larger orbital eccentricity.
- e) Seasons on Earth and Mars are basically the same.

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Chapter 10

If all the ice in Mars's polar caps were melted, how deep an ocean would it make?

- a) about 1 cm
- b) about 10 cm
- c) about 1 m
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- e) about 100 m

Chapter 10

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How does a magnetosphere affect a terrestrial planet atmosphere?

- a) It protects the upper atmosphere from the solar wind.
- b) It protects the upper atmosphere from X-rays.
- c) It redistributes energy from the poles to the equator.
- d) all of the above
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Why did Mars lose most of its atmosphere?

- a) Its atmosphere condensed onto the poles and froze into the soil because Mars is farther from the Sun.
- b) It lost its atmosphere to space after losing its magnetic field.
- c) Its small size prevented it from holding onto its atmosphere.
- d) Its interior cooled so volcanic outgassing stopped.
- e) all of the above

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10.5 Atmospheric History of Venus

- What is Venus like today?
- How did Venus get so hot?

What is the primary constituent of Venus's atmosphere?

- a) nitrogen (N_2)
- b) oxygen (O_2)
- c) water (H_2O)
- d) carbon monoxide (CO)
- e) carbon dioxide (CO_2)

What is the primary constituent of Venus's atmosphere?

- a) nitrogen (N_2)
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Which of the following did not contribute to Venus's runaway greenhouse effect?

- a) Venus is closer to the Sun leading to higher temperatures.
- b) Water evaporated, leading to higher temperatures and more evaporation.
- c) Due to its slow rotation, its magnetic field failed to prevent heating of the atmosphere by the solar wind.
- d) High temperatures and the absence of water caused carbon dioxide to outgas from rocks and enter the atmosphere, leading to higher temperatures.

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- d) High temperatures and the absence of water caused carbon dioxide to outgas from rocks and enter the atmosphere, leading to higher temperatures.

10.6 Earth's Unique Atmosphere

- How did Earth's atmosphere end up so different?
- Why does Earth's climate stay relatively stable?
- How is human activity changing our planet?

Where is most of the Earth's carbon dioxide?

- a) in the atmosphere
- b) in the oceans
- c) in the rainforests
- d) in rocks

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What happens to CO₂ in the Earth's atmosphere during "snowball Earth" periods?

- a) The amount of CO₂ increases because of the large amount of CO₂ present in the global ice sheets.
- b) The amount of CO₂ increases because outgassed CO₂ cannot be dissolved in the frozen oceans.
- c) The amount of CO₂ decreases because the cold temperatures cause CO₂ to condense out into the ice.
- d) The amount of CO₂ decreases because there is less volcanic activity during the cold "snowball Earth" periods.

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How does the current level of atmospheric CO₂ compare to historic levels?

- a) It is 30% higher than it has been anytime in the last 100 years.
- b) It is 30% higher than it has been anytime in the last 10,000 years.
- c) It is 30% higher than it has been anytime in the last million years.
- d) it is 30% higher than it has been anytime in the last 4 billion years.

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How do computer models demonstrate that human activity is affecting the global climate?

- a) Models that include increases in greenhouse gases due to human activity match observed global temperature changes.
- b) Models of CO₂ production by burning of fossil fuels match the observed increases in atmospheric CO₂.
- c) Models that include increases in greenhouse gases due to human activity match observed changes in arctic sea ice.
- d) Models of CO₂ production by burning of fossil fuels match observed changes in CO₂ dissolved in the ocean.

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