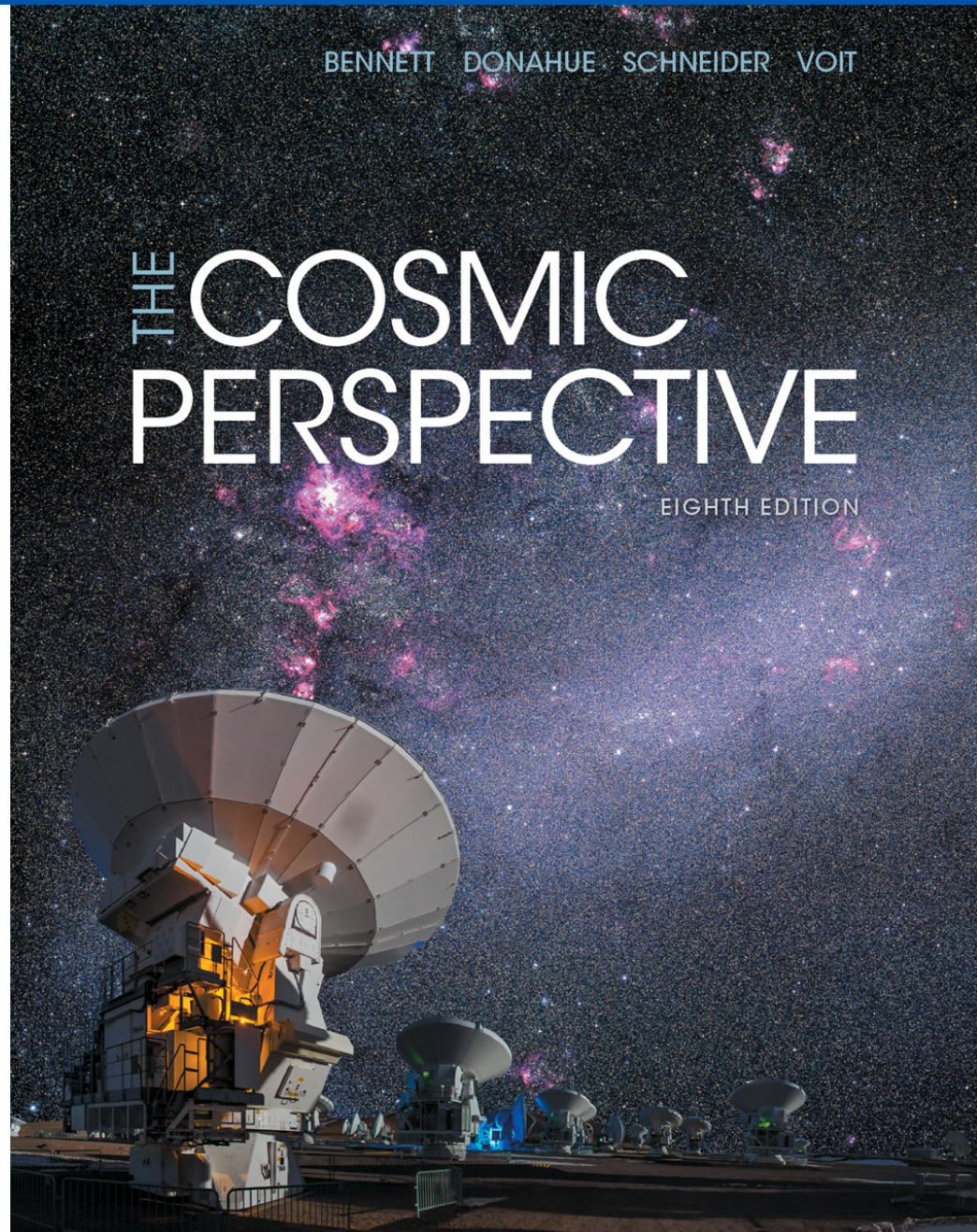


Chapter 9: Planetary Geology: Earth and the Other Terrestrial Worlds



9.1 Connecting Planetary Interiors and Surfaces

- What are terrestrial planets like on the inside?
- What causes geological activity?
- Why do some planetary interiors create magnetic fields?

Which of the following layers of a planet is not characterized by its density?

- a) core
- b) mantle
- c) lithosphere
- d) crust
- e) none of the above

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As a planet cools, what happens to its lithosphere?

- a) Nothing, except it gets colder too.
- b) It gets thicker.
- c) It gets thinner.
- d) It rises to the surface of the planet.
- e) It sinks to the center of the planet.

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Which of the following does *not* transport heat out of a planet's interior?

- a) conduction
- b) convection
- c) differentiation
- d) radiation
- e) none of the above (all are processes that transport heat out of the interior)

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Where in Earth is conduction the most important heat transport process?

- a) in the core
- b) in the mantle
- c) in the lithosphere
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What role does a planet's size play in its geological activity?

- a) Larger planets are more geologically active because they take longer to cool off.
- b) Larger planets are more geologically active because they have thicker lithospheres.
- c) Larger planets are less geologically active because they have thicker lithospheres.
- d) Larger planets are less geologically active because they have larger surface areas to radiate heat away.
- e) Larger planets are less geologically active because there is a greater distance between the core and the surface.

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Which of the following is *not* needed for a planet to have a global magnetic field?

- a) an electrically conducting fluid in the interior
- b) convection in the conducting fluid
- c) moderately rapid rotation
- d) a thick electrically conducting lithosphere

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9.2 Shaping Planetary Surfaces

- What processes shape planetary surfaces?
- How do impact craters reveal a surface's geological age?
- Why do the terrestrial planets have different geological histories?

Which planetary properties control erosion?

- a) size
- b) rotation rate
- c) distance from the Sun
- d) all of the above

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Which of the following geological processes is most evident on the surface of a small planet?

- a) impact cratering
- b) erosion
- c) volcanism
- d) tectonics
- e) size does not affect the geological processes

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The geological age of a planet's surface can be determined from the relative amount of

- a) impact craters.
- b) erosion features.
- c) volcanic features.
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9.3 Geology of the Moon and Mercury

- What geological processes shaped our Moon?
- What geological processes shaped Mercury?

Why are the lunar maria smooth?

- a) They formed after the heavy bombardment and therefore have fewer craters.
- b) The lava that formed the maria lacked gases and was therefore thin and runny.
- c) Bombardment of the Moon by meteoroids smoothed over any original rough features in the maria.
- d) The maria are liquid.
- e) A and B

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Why does Mercury have large cliffs?

- a) They were produced by plate tectonics, much like cliffs on Earth.
- b) They were produced when the interior cooled and the entire planet shrank.
- c) They were produced by the stress of a large upwelling on one side of the planet that produced a bulge with canyons and cliffs.
- d) The cliffs are the rims of large impact basins.

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9.4 Geology of Mars

- What geological processes have shaped Mars?
- What geological evidence tells us that water once flowed on Mars?

Who popularized the idea that there was a network of canals on Mars which carried water from the polar ice caps?

- a) Giovanni Schiaparelli
- b) Percival Lowell
- c) William Herschel
- d) H. G. Wells
- e) Orson Wells

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Which of the following is *not* a similarity between Mars and Earth today?

- a) The lengths of their days are similar.
- b) They both have polar ice caps.
- c) They both have rivers.
- d) They have similar amounts of land.
- e) They have similar axis tilts.

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Which of the following geological processes is currently active on Mars?

- a) volcanism
- b) impact cratering
- c) tectonics
- d) all of the above
- e) none of the above

Which of the following geological processes is currently active on Mars?

a) volcanism

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d) all of the above

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Which of the following is evidence that has been found for liquid water on Mars's surface in the past?

- a) the presence of iron-bearing spheres called "blueberries" that form in water
- b) layered deposits similar to sedimentary rocks
- c) ancient riverbeds
- d) none of the above
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9.5 Geology of Venus

- What geological processes have shaped Venus?
- Does Venus have plate tectonics?

The distribution of craters on the surface of Venus suggests that

- a) its surface is ancient and has not been altered by volcanism, erosion or tectonics since the time of the heavy bombardment.
- b) parts of the surface are ancient, while others have been resurfaced within the last 100 million years.
- c) the entire planet was resurfaced about 750 million years ago.
- d) there has been ongoing regional resurfacing leading to a distribution of surface ages between about 100 million years and 750 million years.

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What feature of Venusian geology is largely unexplained?

- a) It lacks substantial erosion.
- b) It has few impact craters.
- c) It lacks plate tectonics.
- d) None of the above; we understand each of these features.

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9.6 The Unique Geology of Earth

- How is Earth's surface shaped by plate tectonics?
- Was Earth's geology destined from birth?

Which of the following is *not* evidence of plate tectonics on Earth?

- a) There are fossils of similar species on widely separated continents.
- b) Seafloor crust is much younger than continental crust.
- c) Mid-ocean ridges are sites of mantle material eruption and seafloor spreading.
- d) Tidal forces from the Moon and Sun are strong enough to cause continental drift.
- e) none of the above (all are evidence of plate tectonics)

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Plumes of hot mantle material are responsible for

- a) the formation of the Hawaiian Islands.
- b) the geysers of Yellowstone National Park.
- c) the Appalachian mountains.
- d) all of the above.
- e) A and B

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Why does Earth have the youngest surface of all the terrestrial planets today?

- a) It is the largest terrestrial planet so its interior has not cooled too much.
- b) It is not so close to the Sun that it has lost its water and developed a thick lithosphere.
- c) It rotates rapidly.
- d) all of the above
- e) B and C

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- e) B and C