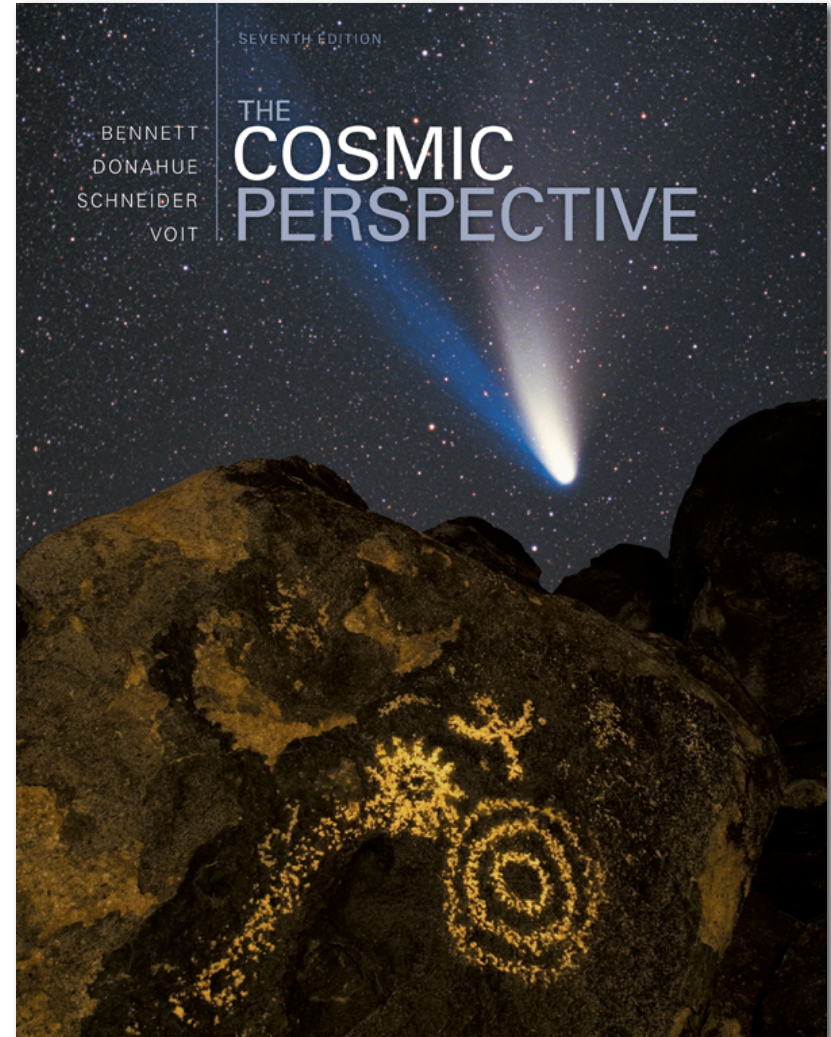


The Cosmic Perspective

Seventh Edition

Jovian Planet Systems



11.1 A Different Kind of Planet

- Are jovian planets all alike?
- What are jovian planets like on the inside?
- What is the weather like on jovian planets?
- Do jovian planets have magnetospheres like Earth's?

How does the composition of Uranus and Neptune compare to the composition of Jupiter and Saturn?

- a) Uranus and Neptune have compositions very similar to Jupiter and Saturn.
- b) Uranus and Neptune are mostly rocky while Jupiter and Saturn are mostly hydrogen and helium.
- c) Uranus and Neptune are mostly hydrogen and helium while Jupiter and Saturn are mostly hydrogen compounds.
- d) Uranus and Neptune are mostly hydrogen compounds while Jupiter and Saturn are mostly hydrogen and helium.
- e) Uranus and Neptune are mostly hydrogen compounds while Jupiter and Saturn are mostly rocky.

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How are the jovian planets affected by their rotation?

- a) Their rapid rotation causes the lighter elements hydrogen and helium to flung out to their outer layers and denser hydrogen compounds to settle in their cores.
- b) Their rapid rotation causes the planets to be slightly flattened, larger across the equator than pole-to-pole.
- c) Their rapid rotation causes a build up of hydrogen and helium near the equator and hydrogen compounds near the cores.
- d) Their rapid rotation causes the planets to be stretched, larger pole-to-pole than across the equator.
- e) none of the above

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The core of Jupiter is

- a) about the same size as Earth.
- b) is about the same mass as Earth.
- c) is about the same composition as Earth.
- d) A and B
- e) all of the above

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The interior of which jovian planet is heated by helium rain?

- a) Jupiter
- b) Saturn
- c) Uranus
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- e) all of the above

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Why are methane clouds not seen on Jupiter and Saturn?

- a) Jupiter and Saturn do not have enough methane to make clouds.
- b) The atmospheres of Jupiter and Saturn are too warm for methane clouds to form.
- c) Because of their relatively warmer temperatures, Jupiter and Saturn have clouds of water that obscure our view of their methane clouds.
- d) Jupiter and Saturn have sulfur compounds that combine with all their methane to make reddish methane-sulfide clouds.
- e) Methane clouds *are* seen on Jupiter and Saturn.

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What causes the white bands we see on Jupiter?

- a) formation of ammonia clouds in regions of rising air
- b) formation of water clouds in regions of rising air
- c) gaps in ammonium hydrosulfide clouds revealing ammonia clouds below
- d) gaps in ammonium hydrosulfide clouds revealing water clouds below
- e) snow on mountain peaks

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Which of the jovian planets has no seasons?

- a) Jupiter
- b) Saturn
- c) Uranus
- d) Neptune
- e) none of the above (all have seasons)

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Where is Neptune's magnetic field generated?

- a) in a layer of metallic hydrogen
- b) in an ocean of hydrogen and helium
- c) in an ocean of hydrogen compounds, rocks, and metals
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11.2 A Wealth of Worlds: Satellites of Ice and Rock

- What kinds of moons orbit the jovian planets?
- Why are Jupiter's Galilean moons so geologically active?
- What is remarkable about Titan and the other major moons of the outer solar system?
- Why are small icy moons more geologically active than small rocky planets?

Which planet has the most large moons?

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- b) Saturn
- c) Uranus
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- a) a subsurface water ocean.
- b) geysers of water at its south pole.
- c) tectonic surface features.
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Io, Europa, and Ganymede have tidal heating because

- a) an orbital resonance keeps their orbits elliptical.
- b) they are the closest moons to Jupiter.
- c) an orbital resonance causes the moons to exert tidal forces on each other.
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What is the largest moon in the solar system?

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- b) Europa
- c) Ganymede
- d) Titan
- e) Triton

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What is the liquid in Titan's rivers and lakes?

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- b) sulfur
- c) methane and ethane
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- d) It has a large axis tilt.

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Why are some small jovian planet moons geologically active?

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- b) Impact cratering melted the interior.
- c) Ice is able to deform at lower temperatures than rock.
- d) all of the above

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11.3 Jovian Planet Rings

- What are Saturn's rings like?
- How do other jovian ring systems compare to Saturn's?
- Why do the jovian planets have rings?

What causes waves in Saturn's rings?

- a) orbital resonances from nearby moons
- b) variations in the composition of the ring particles
- c) impacts into the rings
- d) eruptions from nearby moons
- e) impacts from charged particles in the magnetosphere

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Which of the following is not a similarity between all jovian planet ring systems?

- a) They are all on nearly circular orbits.
- b) They are all on nearly equatorial orbits.
- c) They all have features shaped by moons and resonances.
- d) They are all made of bright icy particles.

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Why don't ring particles form a moon?

- a) They collide too violently to accrete into a moon.
- b) Tidal forces from moons prevent them from accreting.
- c) Tidal forces from the planet prevent them from accreting.
- d) Their masses are too small for them to accrete.
- e) They collide too infrequently to make a moon.

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