



Today's Class: The Planet Venus

- Further reading on *Venus & Climate Change* for next class – Section 10.5 in Cosmic Perspective.
- Homework #5 due on Monday.
- Back to on-line learning starting Nov. 16.

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Last Class

- Mercury
 - Interiors of Terrestrial Planets.
 - Heating
 - Cooling
 - What geological processes shaped Mercury?
 - NASA's Messenger mission to Mercury.

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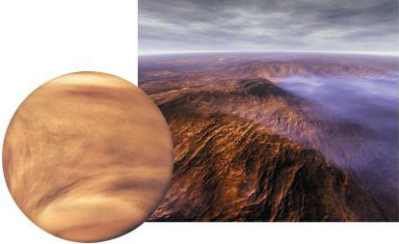
Today's Class

- Overview of Venus.
- Measuring distance to Venus.
- What geological processes shaped Venus?
 - Cratering
 - Volcanism
 - Tectonics
- Spacecraft Observations of Venus
 - Venera
 - Magellan

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Overview of Venus




- Nearly identical in size to Earth (radius is 95% of Earth); mass = 82% of Earth; surface hidden by clouds
- Hellish conditions due to an extreme Greenhouse Effect!
- Even hotter than Mercury: 470°C (880°F), day and night

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Transit of Venus



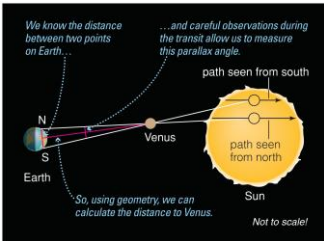
Transit of Venus: June 6, 2012

- Apparent position of Venus on Sun during transit depends on distances in solar system and your position on Earth.

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Measuring Distance to Venus

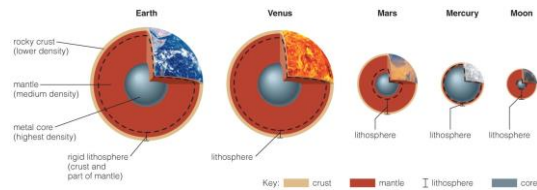


- Measure apparent position of Venus on Sun from two locations on Earth
- Use trigonometry to determine Venus's distance from the distance between the two locations on Earth

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Terrestrial Planet Interiors

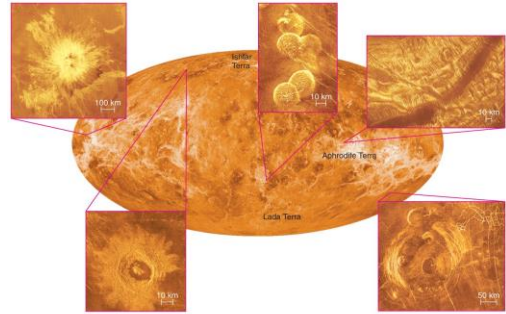


- Interiors of Venus and Earth appear to be very similar.
- But, Venus' rotation period is 243 Earth days!
- Does Venus have a planet-wide magnetic field?

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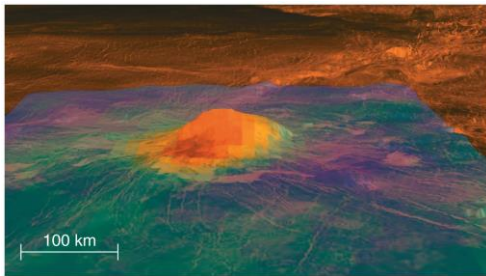
What geological processes have shaped Venus?



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Radar Mapping

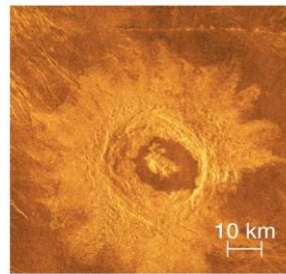


- Its thick atmosphere forces us to explore Venus's surface through radar mapping.

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Cratering on Venus



- Venus has impact craters, but fewer than the Moon, Mercury, or Mars.

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Class Exercise: Why do you think Venus has few impact craters relative to Mars?

- Venus is so close to the Sun that it was never bombarded by asteroids or comets.
- It's thick atmosphere stopped most of the impactors.
- Other geological processes have wiped out craters.
- Ancient dinosaurs on Venus destroyed evidence of previous impacts.

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Why do you think Venus has few impact craters relative to Mars?

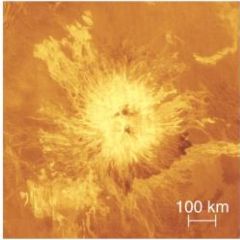
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Volcanoes on Venus

- It has many volcanoes, including both shield volcanoes and stratovolcanoes.



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Stratovolcano outside of Puebla, Mexico

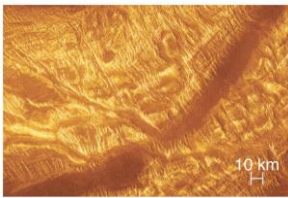


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Tectonics on Venus

- The planet's fractured and contorted surface indicates tectonic stresses.



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Does Venus have plate tectonics?

- Venus does not appear to have plate tectonics, but entire surface seems to have been "repared" 750 million years ago.
 - Weaker convection?
 - Thicker or more rigid lithosphere?

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Erosion on Venus

- Photos of rocks taken by landers show little erosion.

=> Too hot for rain or ice and slow rotation means weak surface winds.



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Spacecraft Observations of Venus

USSR Venera Missions:

- Total of 16 launches from 1961 – 1983.
- Many launch failures.
- First and only images of the surface of Venus!



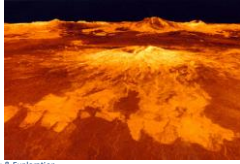
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Spacecraft Observations of Venus

U.S. Magellan Mission:

- 1989-1994
- Collected radar images of 98% of the planet.
- Studied role of impacts, volcanism, & tectonics.
- Found lava channels 6000 km long.
- No evidence of wind erosion in contrast to Mars



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