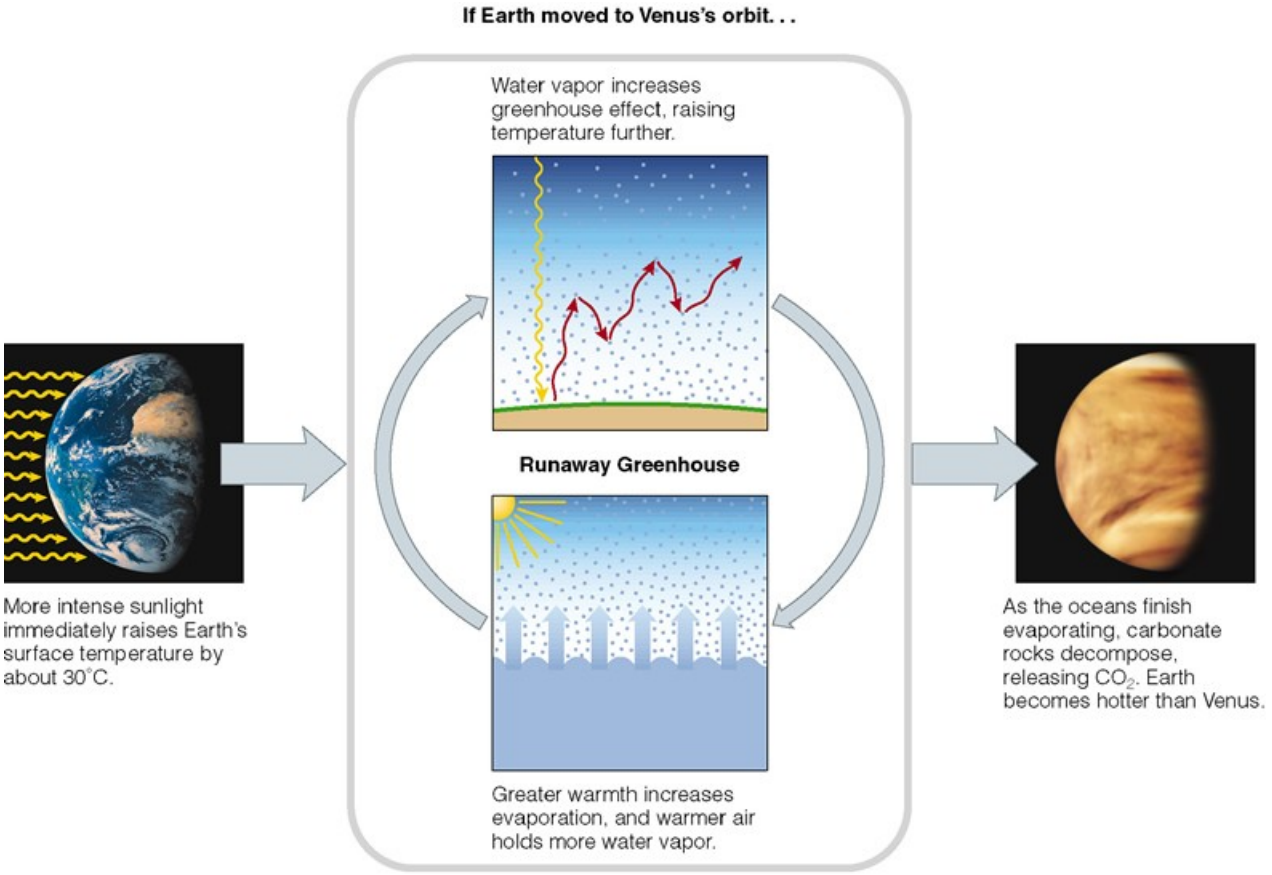
Jovian Atmospheres and Magnetospheres

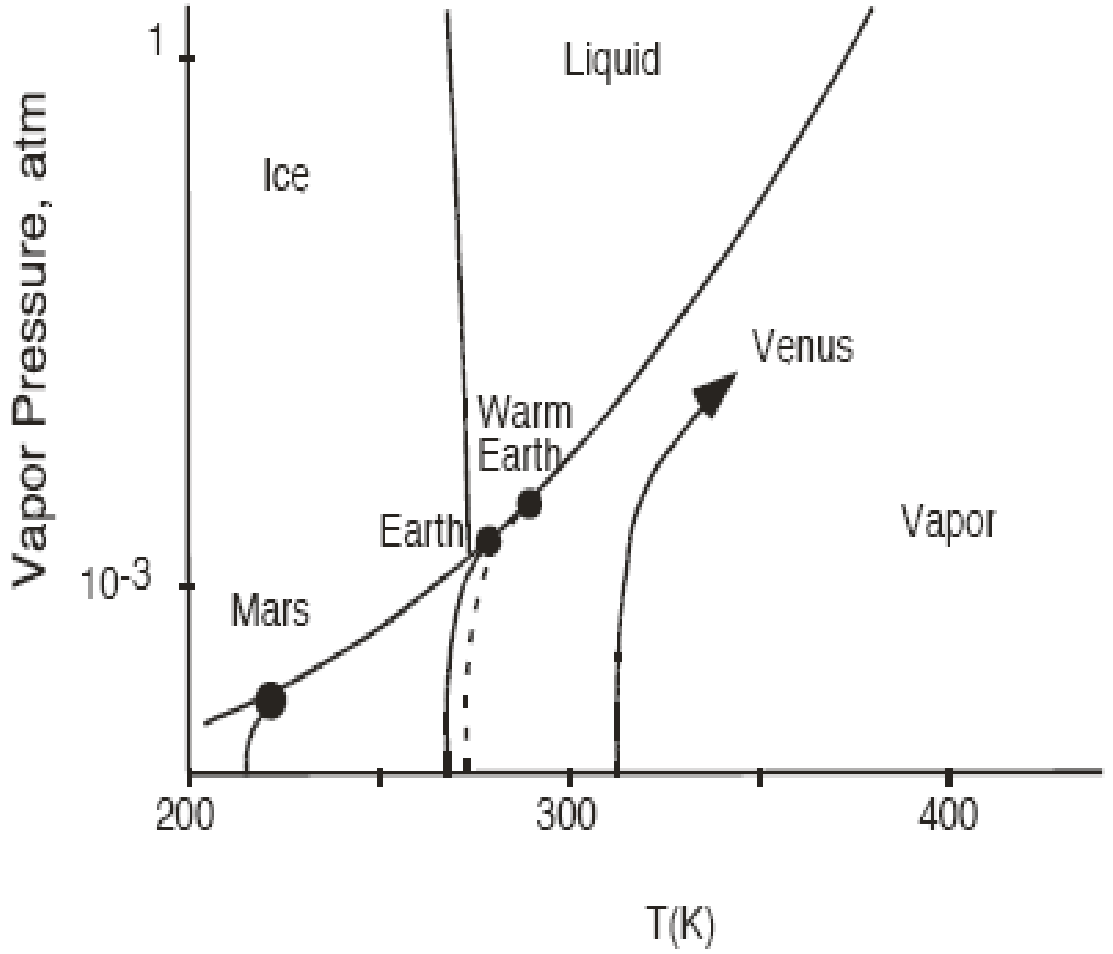
Opening Discussion

- Have you seen anything interesting in the news?
- What would I choose for a super power?

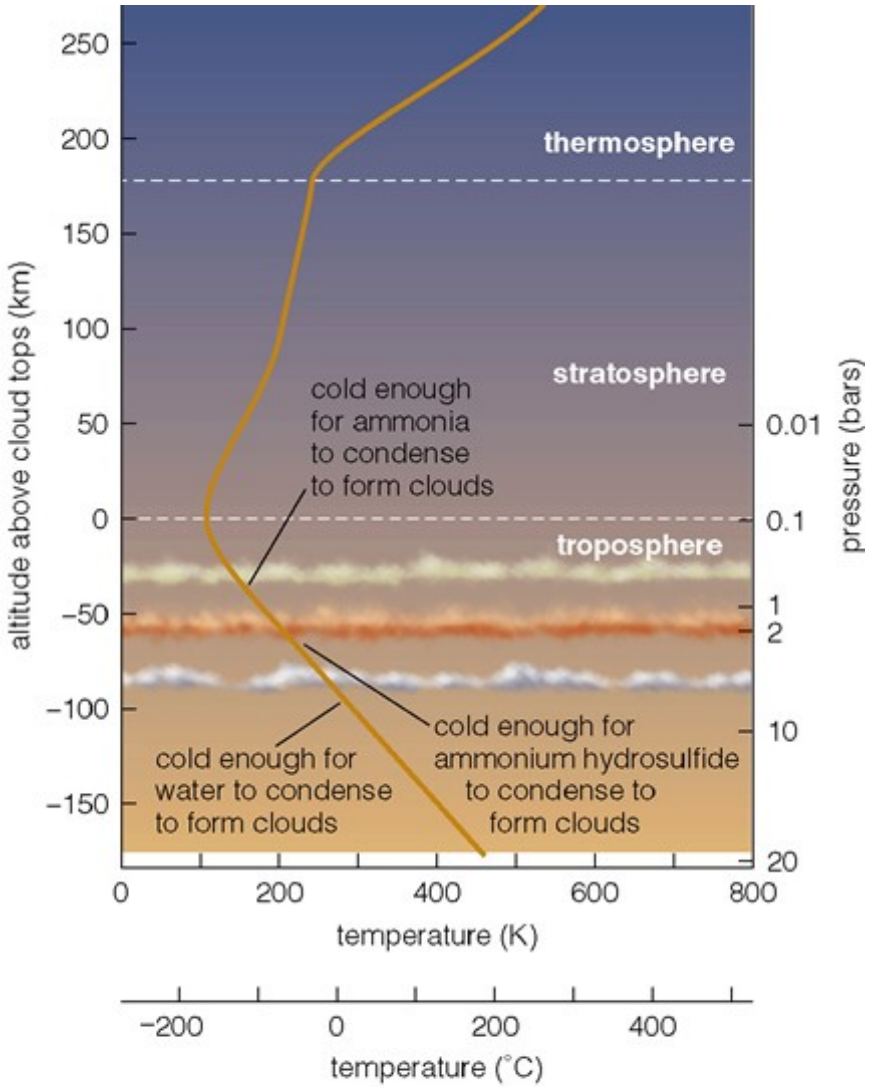
Runaway Greenhouse

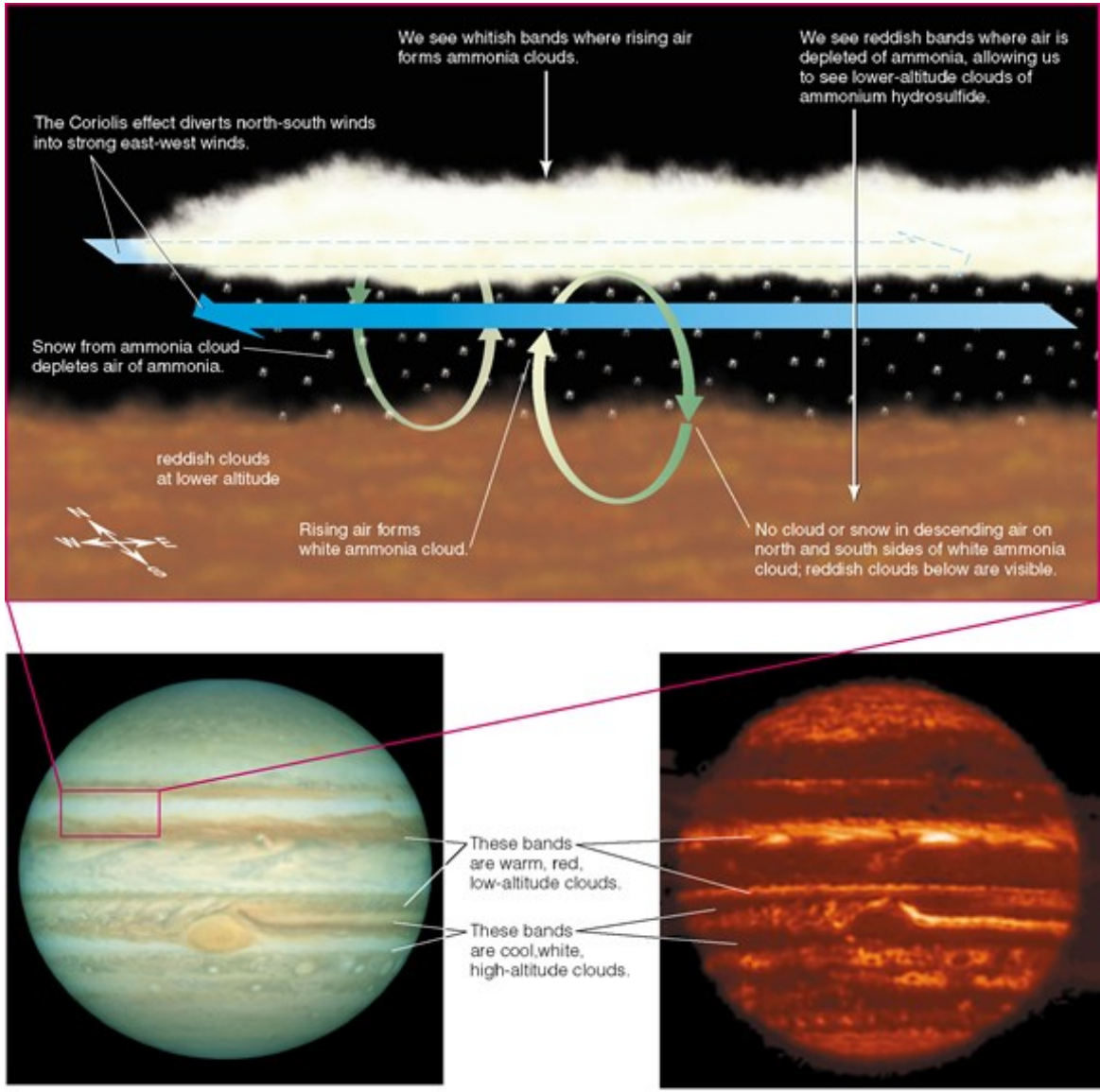


Why Only Venus?



Jupiter's Atmosphere

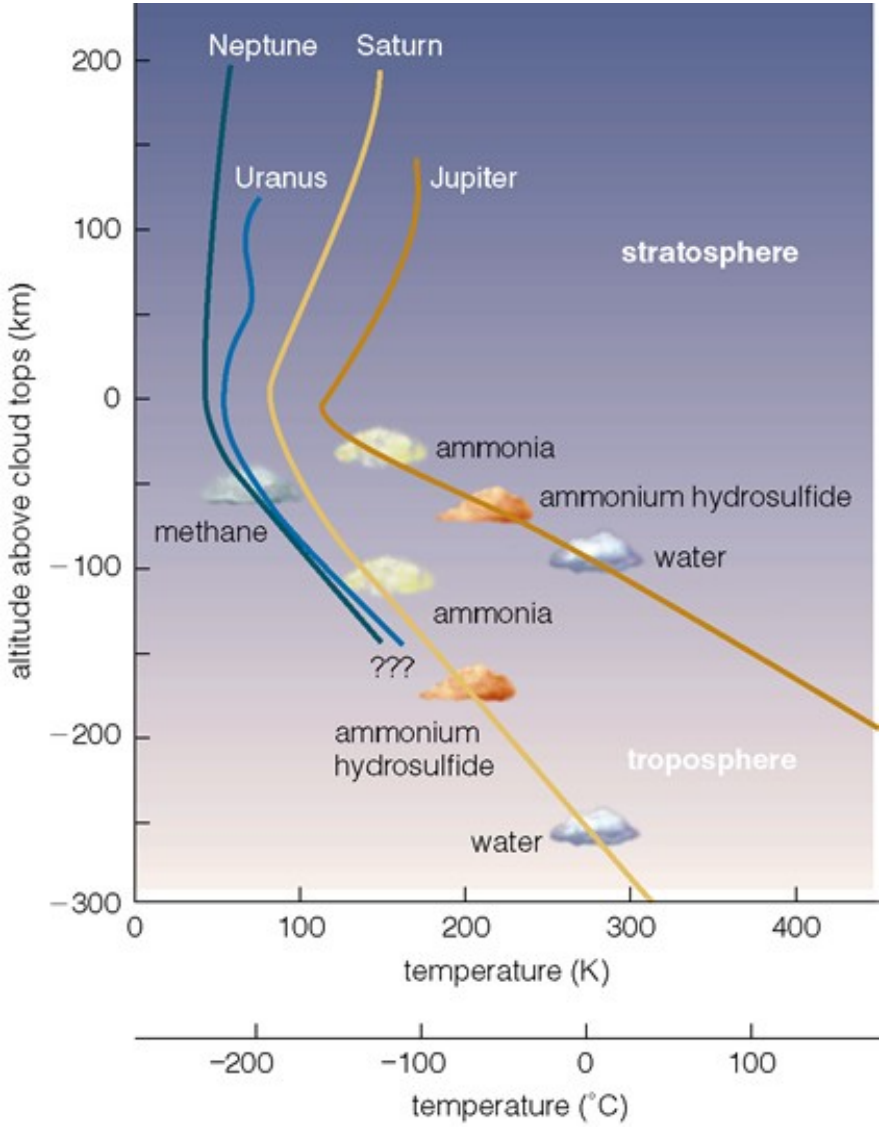




Storms and Winds

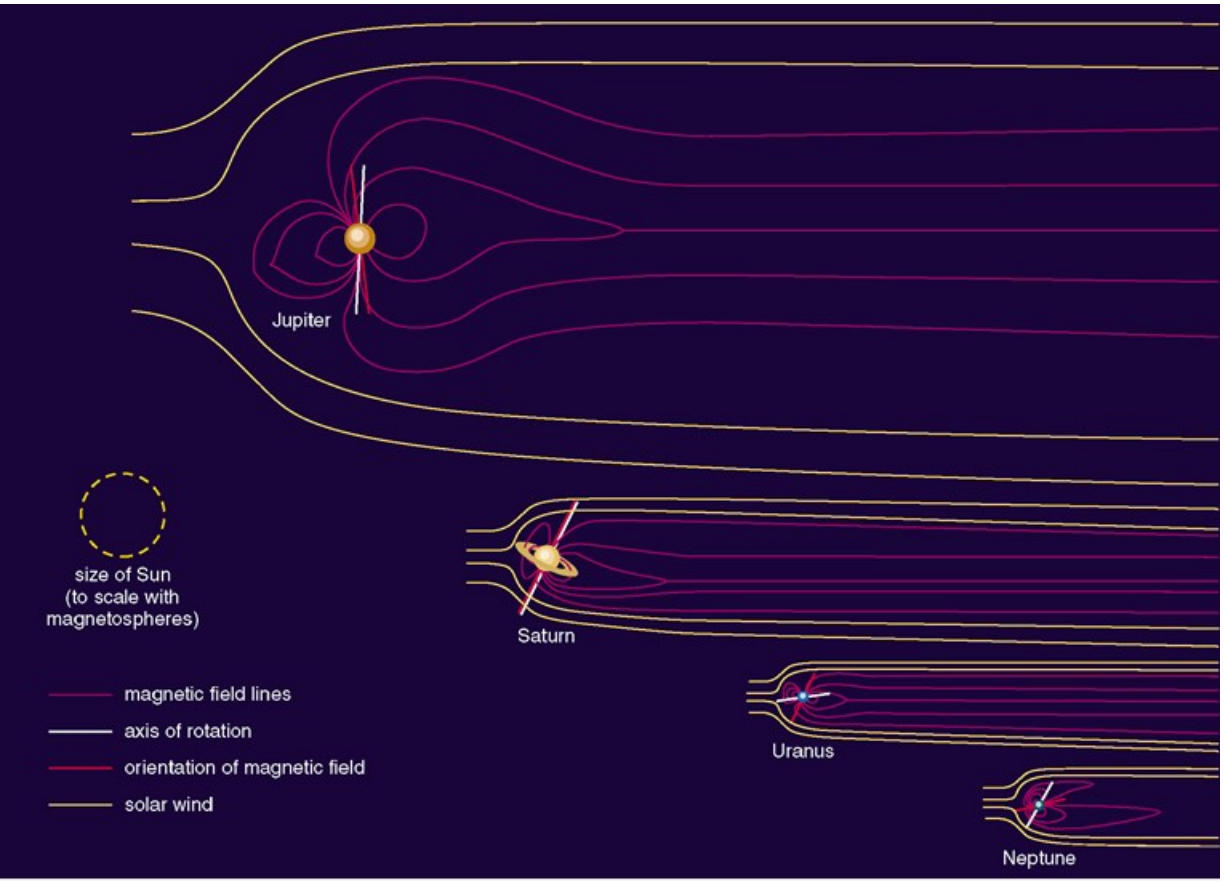
- Strong Coriolis forces produce remarkably strong winds on Jupiter and Saturn just in the bands, you don't have to be in the many storms on the planets.
- The storms that form are impressive in their own right. The Great Red Spot is a high pressure region that rotates counterclockwise. It is two Earth radii across and has been there for over 300 years.
- The chemistry of the brown and red colored clouds on Jupiter has not been well explained.

Comparing Atmospheric Structure



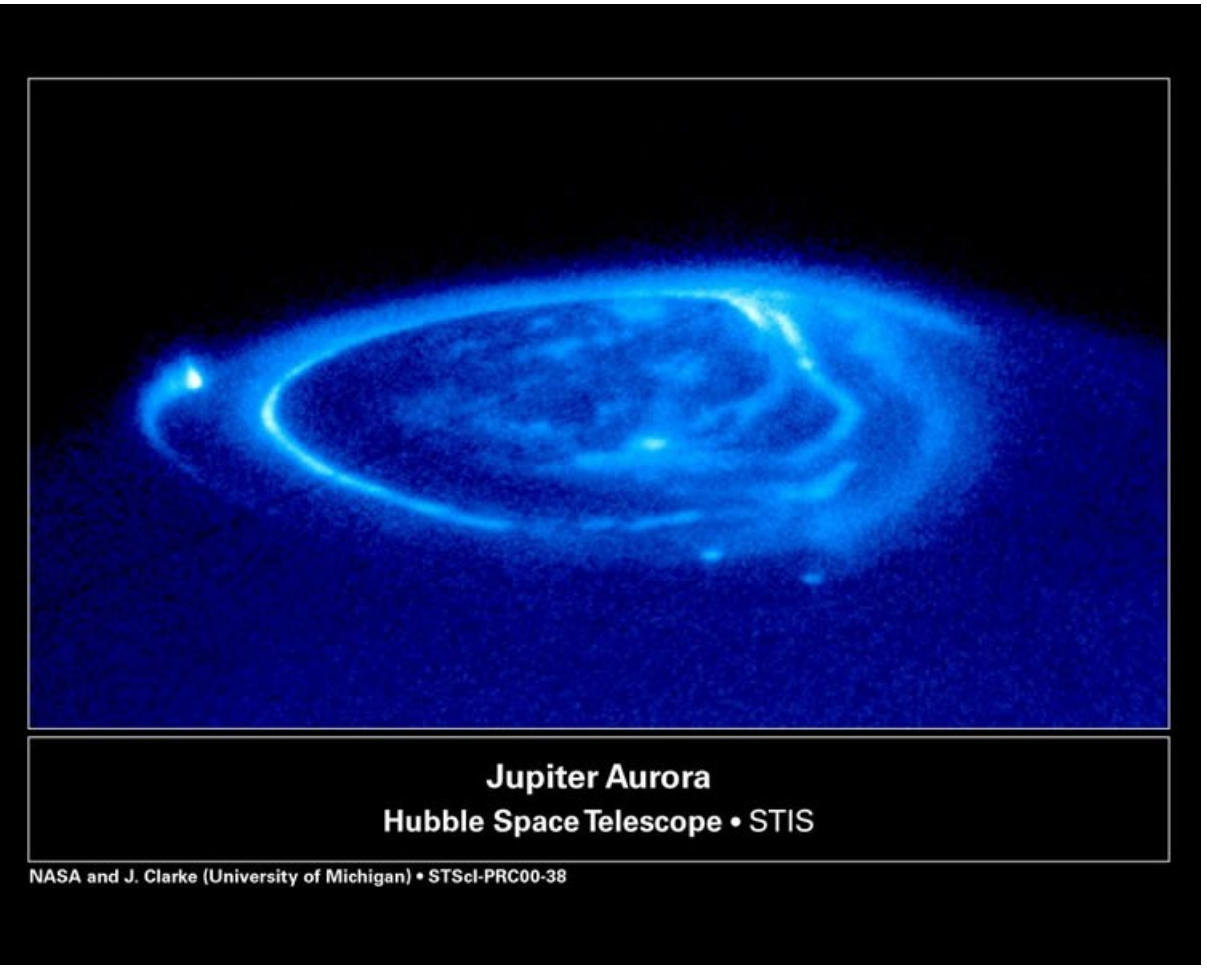
- The structure of the Jovian atmospheres differs as a result of distance from the Sun and mass.
- Hazes obscure things on Saturn and Uranus. Saturn has the fastest winds.
- When Voyager 2 went by Uranus there was virtually no weather seen. Now we can see significant weather in Hubble images.
- Methane clouds are the reason by Uranus and Neptune appear blue.

Jovian Magnetospheres



- All four of the Jovian planets have magnetic fields that produce magnetospheres. The magnet field and magnetosphere of Jupiter are the largest. Jupiter's magnetic field is 20,000 times as strong as that of the Earth.

Jovian Aurora



- The strong magnetic fields mean these planets have aurora like on the Earth.
- The aurora are Jupiter are particularly impressive because the moon Io provides a large population of charged particles.

Saturnian Rings

- Saturn's rings display nearly all the features of the rings around the other 3 Jovian planets as well as broad thick rings.
- The E ring is a thin dusty ring made of material from the inner moons.
- The F ring is a narrow ring with two shepherd satellites: Prometheus and Pandora.
- Saturn also has the broad A, B, C, and D rings. These contain gaps and have many small scale features in them produced by moons or other forcings.

Minute Essay

- Why do Jupiter and Saturn have numerous colored bands? Why are they different colors?