

Lecture 24:
The Jovian Planets



Astronomy 141 – Winter 2012

This lecture compares and contrasts the properties of the four Jovian Planets of the Solar System.



Jupiter and Saturn are Gas Giants: mostly hydrogen & helium with deep metallic hydrogen mantles and rocky cores.

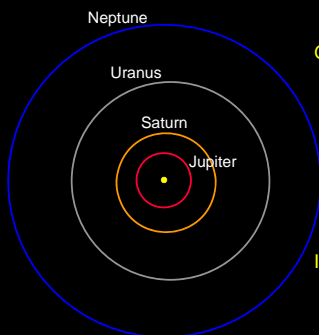


Uranus and Neptune are Ice Giants: thin hydrogen & helium atmospheres over deep ice & rock mantles.

All have **reducing atmospheres** dominated by Hydrogen chemistry.

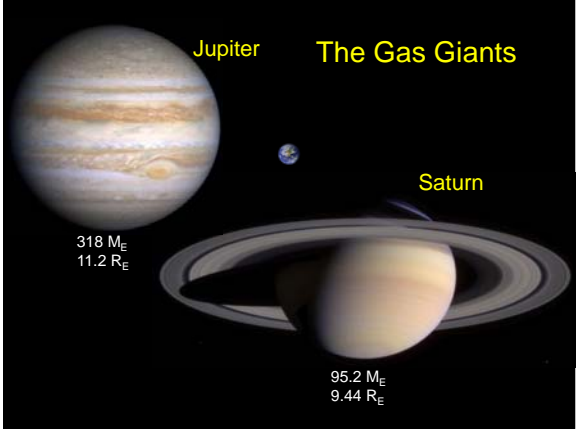
All Jovian planets have extensive moon systems, including 6 of the 7 giant moons of our Solar System.

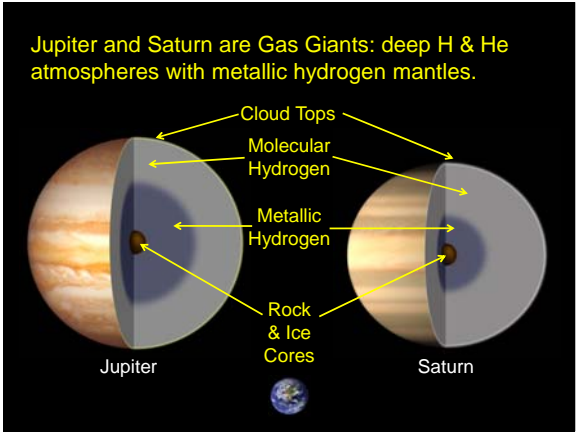
The Outer Planets are gas giants and ice giants

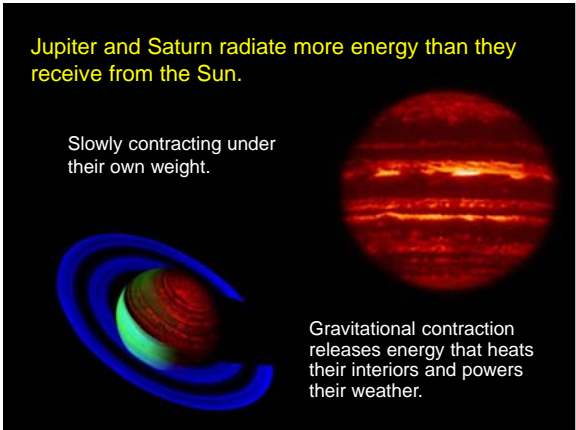


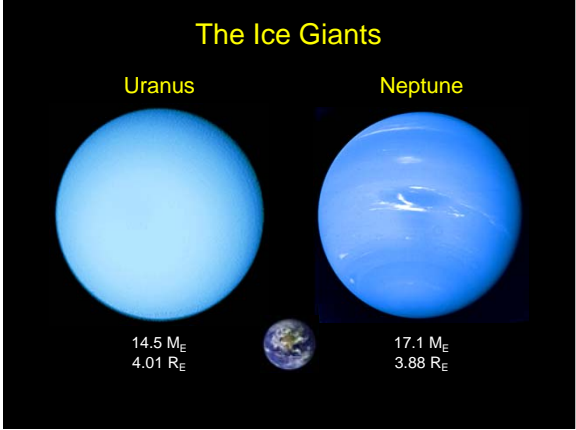
Gas Giants:
Jupiter & Saturn
5 & 10 AU from the Sun

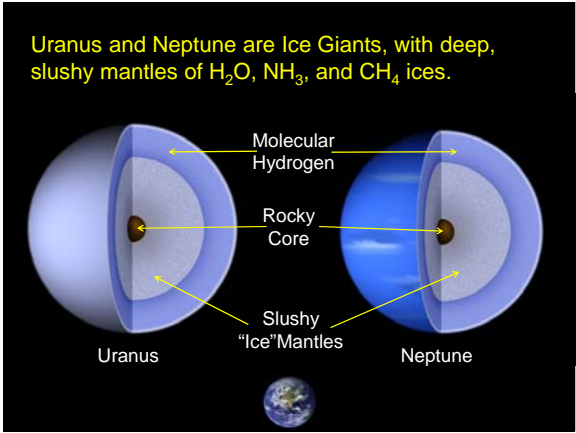
Ice Giants:
Uranus & Neptune
20 & 20 AU from the Sun

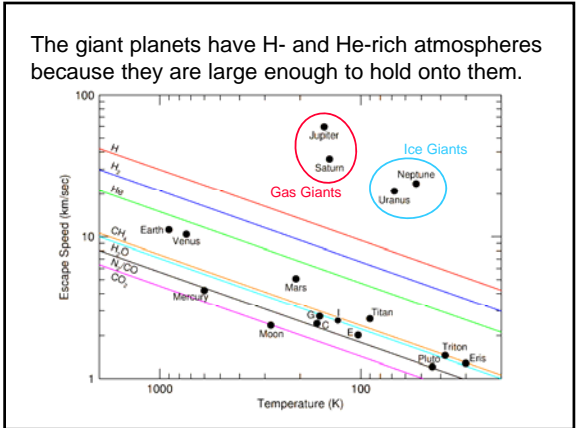




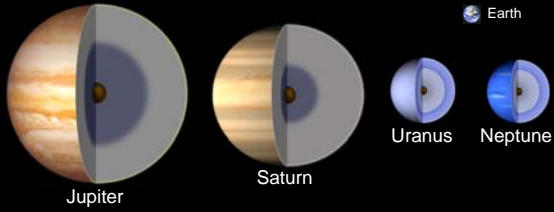








The Jovian Planets have no solid surfaces, and atmospheres dominated by Hydrogen Chemistry



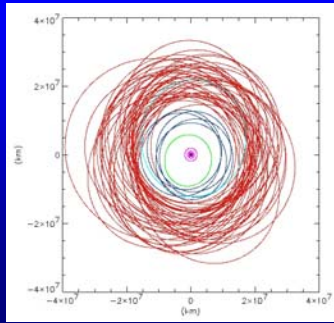
Reducing Atmospheres rich in H_2 , H_2O , CH_4 , NH_3 and He

Terrestrial Planets have Oxidizing Atmospheres rich in H_2O , CO_2 , and N_2 (O_2 on Earth).

Jupiter has 63 named moons, four of which are the giant Galilean Moons.

4 Galilean moons:
Large (>3000 km)
Spherical
Differentiated

59 Small moons:
Small (<200 km)
Irregular in shape
Undifferentiated
Total mass <0.1%
mass of Europa



The Galilean Moons are giant moons, three larger than our own Moon.



Saturn has 61 moons, including the Giant Moon Titan and 6 spherical icy moons.

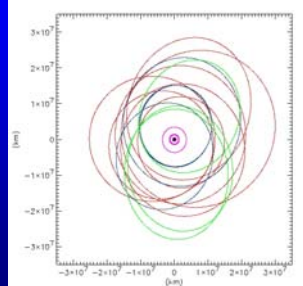
Sizes: 1 – 1500 km

>300 km are *spherical*
<300 km are *irregular*

Density: 0.3 – 1.5 g/cc

Rock+Ice or mostly Ice

Ancient, heavily cratered surfaces.



The Large Moons of Saturn

Diameter > 200 km

Titan



Uranus has 27 known moons, none large enough to be Giant Moons.



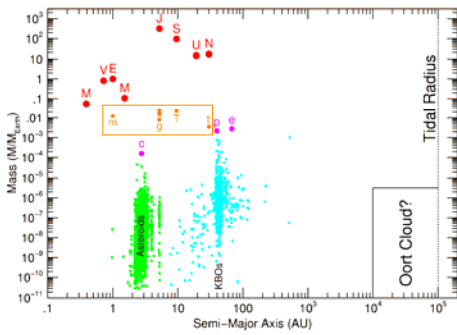
Neptune has 13 known moons, the largest is the Giant Moon Triton.

Most of the moons are tiny, icy, and irregular in shape.



Triton most resembles the icy Dwarf Planets Pluto & Eris

The Giant Moons are larger than most of the Dwarf Planets.



The moon Titan is big enough to have a heavy atmosphere of Nitrogen (N_2) and Methane (CH_4).

