

MEXBOROUGH & SWINTON ASTRONOMICAL SOCIETY



JUPITER WATCH

16TH & 17TH October 2009



The planet Jupiter is shown in the adjacent Hubble Space Telescope true-color image. Jupiter is by far the largest of the planets. It is more than twice as massive as all other planets combined; if it had been only about 100 times more massive at birth (not so much by astronomical standards) it would have become a star instead of a planet. Then the Solar System might be a double star system instead of a single star with a planetary system.



Jupiter has features very different from terrestrial planets. Its composition is more like that of stars, and if it has any solid surface it is hidden deep at its center: Jupiter is apparently almost entirely gas and liquid. It also has an internal energy source and enormous magnetic fields. Finally, the 4 largest moons of Jupiter (the Galilean Moons) are sufficiently interesting in their own right that they are among the most studied objects in the Solar System.

Our most detailed information concerning Jupiter has come from the space probes Pioneer 10 (1973), Pioneer 11 (1974), Voyager I (March, 1979), Voyager II (July, 1979), and Galileo (1995-present). The first 4 were flyby missions; the Galileo probe was inserted into orbit around Jupiter December, 1995, and launched a probe into the atmosphere that transmitted information before being destroyed.

The planet Jupiter is 5.2 A.U.* from the Sun on average, which corresponds to an orbital period of 11.9 Earth years. It is the most massive planet, being 318 times as massive as the Earth, and about 2 1/2 times the mass of all other planets combined.

Jupiter is massive because it has a large diameter (11.2 times that of Earth). Its density is only 1.33 g/cc, which is 1/4 that of Earth, and only slightly more than the 1 g/cc characteristic of water. This very low density compared with the terrestrial planets is because it is composed mostly of hydrogen and helium, in ratios similar to that found in stars (approximately 82% hydrogen and 17% helium by mass).

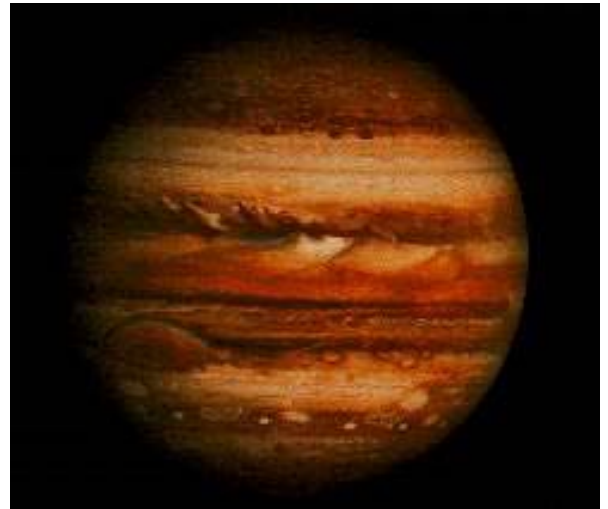
Furthermore, Jupiter is almost entirely gas and liquid. Therefore, Jupiter and the related planets Saturn, Uranus, and Neptune are sometimes called *Gas Giants* (these are also called the *Jovian Planets*, since Jove was another name for Jupiter). It is thought that Jupiter probably has a small rocky core comparable in size to terrestrial planets and perhaps with a similar composition, but there no direct evidence of this.



Because Jupiter is not solid its parts do not rotate at exactly the same velocity. However, measurements of the rotation of the magnetic field give a rotation period, a Jovian day, of 9 hours and 55 minutes. This rapid rotation and the gas and liquid structure give rise to a pronounced equatorial bulge that is evident in images such as the adjacent one.

As also indicated in the adjacent computer-enhanced image, the atmosphere has clouds with a colorful and complex structure. These features are partially associated with the effect of very high velocity winds in the Jovian atmosphere (as much as 900 km/hr).

It also has a large, complex, and very intense magnetic field, and has a system of 16 moons that is a kind of miniature Solar System unto itself. It has an internal heat source, since it emits more radiation than it receives. This is thought to be associated with residual heat left over from the formation of the planet. Finally, it even has a faint ring.



The Great Red Spot

The most prominent feature is the "Great Red Spot", which may be seen on the right of the upper left image, just below the equator, and in the two images shown below. It is a kind of large and persistent storm driven by Jupiter's internal heat source.



Jupiter with two moons seen against its surface

Jupiter's clouds near the Great Red Spot

*One A.U. is the distance between the Sun and the Earth (93million miles+-)