**Planets in Our Solar System**

**太阳系中的行星**

The Sun is the hub of a huge rotating system consisting of nine planets, their satellites, and numerous small bodies, including asteroids, comets, and meteoroids. An estimated 99.85 percent of the mass of our solar system is contained within the Sun, while the planets collectively make up most of the remaining 0.15 percent. The planets, in order of their distance from the Sun, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Under the control of the Sun's gravitational force, each planet maintains an elliptical orbit and all of them travel in the same direction.

九大行星、它们的卫星以及数以亿计的小天体，包括小行星、彗星和陨星，共同构成了一个巨大的公转系统而太阳是这个公转系统的核心。太阳系中，太阳的质量占大约99.85%，而所有行星的质量加起来占剩下的0.15%。九大行星按照距离太阳的远近依次为：水星、金星、地球、火星、木星、土星、天王星、海王星和冥王星。在太阳引力的作用下，每个行星都沿着椭圆形的轨道，按照相同的方向公转。

The planets in our solar system fall into two groups: the terrestrial (Earth-like) planets (Mercury, Venus, Earth, and Mars) and the Jovian (Jupiter-like) planets (Jupiter, Saturn, Uranus, and Neptune). Pluto is not included in either category, because its great distance from Earth and its small size make this planet's true nature a mystery.

太阳系中九大行星分为两类：类地行星(和地球类似，包括水星、金星、地球和火星)和类木行星(与木星类似，包括木星、土星、天王星和海王星)。冥王星不属于这两类中的任何一个，因为它距地球很远且体积较小，所以目前冥王星的真实形态仍然是个谜。

The most obvious difference between the terrestrial and the Jovian planets is their size. The largest terrestrial planet, Earth has a diameter only one quarter as great as the diameter of the smallest Jovian planet, Neptune, and its mass is only one seventeenth as great. Hence, the Jovian planets are often called giants. Also, because of their relative locations, the four Jovian planets are known as the outer planets, while the terrestrial planets are known as the inner planets. There appears to be a correlation between the positions of these planets and their sizes.

类地行星和类木行星最为明显的差别就在于它们的体积。比如最大的类地行星地球的直径仅仅是最小的类木行星海王星的四分之一，而质量更是只有海王星的1/17。因此，类木行星通常又被称为巨行星。又因这四颗类木行星与地球的相对位置，它们也被称为外行星，而类地行星则相应被称作内行星。这表示行星的位置与体积之间是有关联的。

Other dimensions along which the two groups differ markedly are density and composition. The densities of the terrestrial planets average about 5 times the density of water, whereas the Jovian planets have densities that average only 1.5 times the density of water. One of the outer planets, Saturn, has a density of only 0.7 that of water, which means that Saturn would float in water. Variations in the composition of the planets are largely responsible for the density differences. The substances that make up both groups of planets are divided into three groups—gases, rocks, and ices—based on their melting points. The terrestrial planets are mostly rocks: dense rocky and metallic material, with minor amounts of gases. The Jovian planets, on the other hand, contain a large percentage of the gases hydrogen and helium, with varying amounts of ices: mostly water, ammonia, and methane ices.

两类行星其它方面的区别中，比较显著的是密度和构成成分。类地行星的平均密度大约为水的5倍，而类木行星的平均密度大概只有水的1.5倍。外行星中土星的密度只有水的0.7倍，也就是说土星可以浮在水上。行星的构成成分不同很大程度上是因为密度差异。两类行星的构成物质根据熔点可以划分为三类——气体、岩石和冰。类地行星多数由岩石(致密岩石和金属材料)以及少量气体构成。而类木行星恰恰相反，包含较大比例的气态氢和氦，以及各种形态的冰(大部分是水、氨和甲烷冰)。

The Jovian planets have very thick atmospheres consisting of varying amounts of hydrogen, helium, methane, and ammonia. By comparison, the terrestrial planets have meager atmospheres at best. A planet's ability to retain an atmosphere depends on its temperature and mass. Simply stated, a gas molecule can "evaporate" from a planet if it reaches a speed known as the escape velocity. For Earth, this velocity is 11 kilometers per second. Any material, including a rocket, must reach this speed before it can leave Earth and go into space. The Jovian planets, because of their greater masses and thus higher surface gravities, have higher escape velocities (21-60 kilometers per second) than the terrestrial planets. Consequently, it is more difficult for gases to "evaporate" from them. Also, because the molecular motion of a gas depends on temperature, at the low temperatures of the Jovian planets even the lightest gases are unlikely to acquire the speed needed to escape. On the other hand, a comparatively warm body with a small surface gravity, like Earth's moon, is unable to hold even the heaviest gas and thus lacks an atmosphere. The slightly larger terrestrial planets Earth, Venus, and Mars retain some heavy gases like carbon dioxide, but even their atmospheres make up only an infinitesimally small portion of their total mass.

类木行星有非常致密的大气层，主要由变化量的氢、氦、甲烷和氨组成。相比之下，类地行星的大气层则要稀薄得多。一个行星保持大气的能力取决于其温度和质量。简单来说，如果气体达到逃逸速度，那么气体分子可以从行星上“蒸发”。地球的逃逸速度大约为11千米/秒。任何物质，包括火箭，要离开地球进入太空就必须达到这个速度。由于类木行星的质量较大并因此产生更高的表面引力，因此，类木行星的逃逸速度(21～60千米/秒)要比类地行星高得多。所以，气体从类木行星的表面“蒸发”就更为困难。同时又因为气体分子运动取决于温度，所以在类木行星这样的低温环境下，即使是最轻的气体也无法达到所需要的逃逸速度。而从另一个角度讲，一个相对温暖表面引力很小的天体，比如月球，甚至无法留住最重的气体，因此没有大气层。体积稍大的类地行星，比如地球、金星和火星，保持了二氧化碳等一部分较重的气体，但即便如此，大气构成也只占它们总质量的很小一部分。

The orderly nature of our solar system leads most astronomers to conclude that the planets formed at essentially the same time and from the same material as the Sun. It is hypothesized that the primordial cloud of dust and gas from which all the planets are thought to have condensed had a composition somewhat similar to that of Jupiter. However, unlike Jupiter, the terrestrial planets today are nearly void of light gases and ices. The explanation may be that the terrestrial planets were once much larger and richer in these materials but eventually lost them because of these bodies' relative closeness to the Sun, which meant that their temperatures were relatively high.

太阳系有序的性质使得大部分天文学家得出结论：行星基本形成于同一时间并且构成物质与太阳相同。天文学家们推测，所有行星原始状态的尘埃和气体形成的云状物凝聚，合成物与木星的有些类似。然而，和木星不同的是，如今类地行星上的轻质气体和冰极度缺乏。有一种解释认为，类地行星曾经体积更大并且物质构成上更为丰富多样，但因为它们距太阳较近致使温度相对较高而最终失去这些物质。