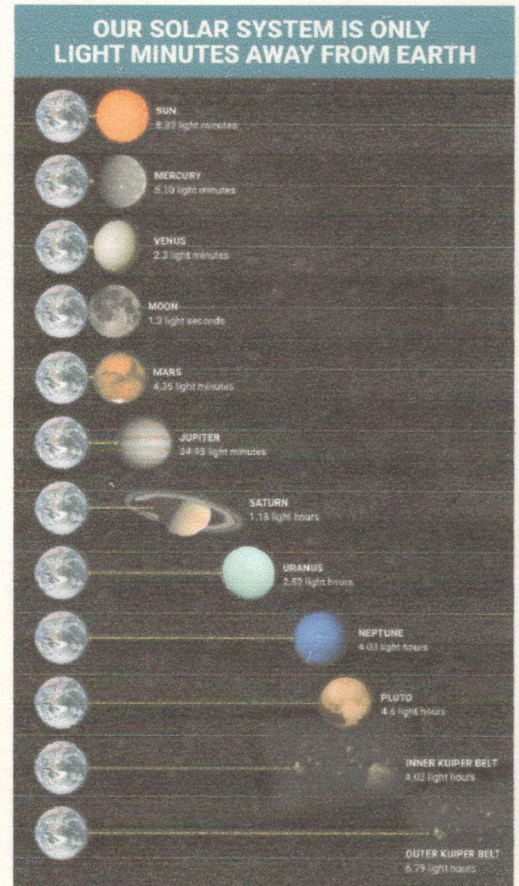
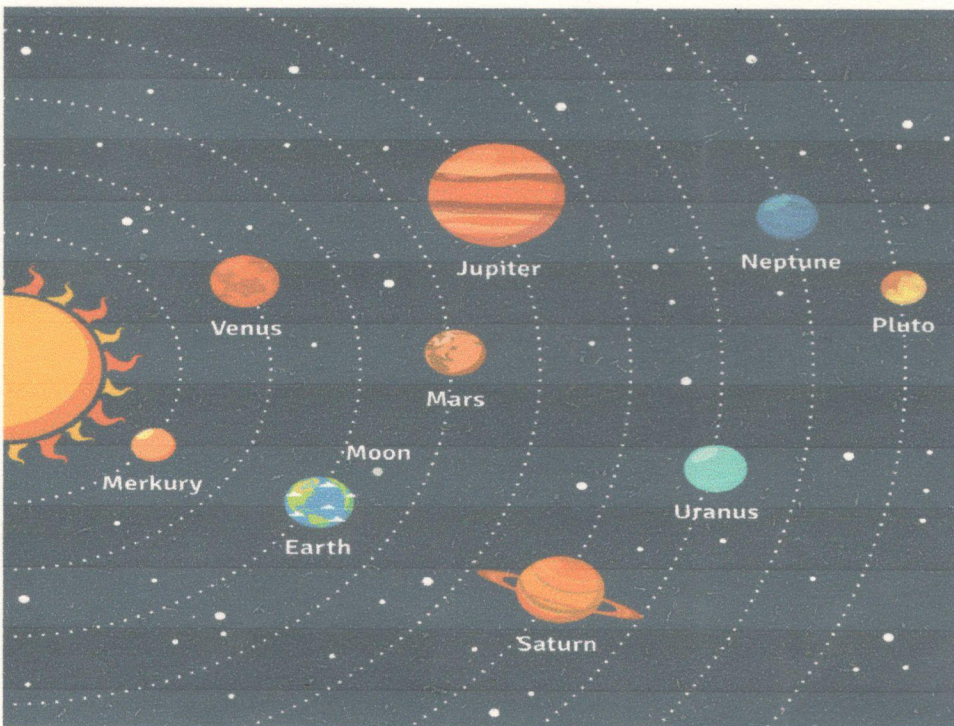


THE SOLAR SYSTEM

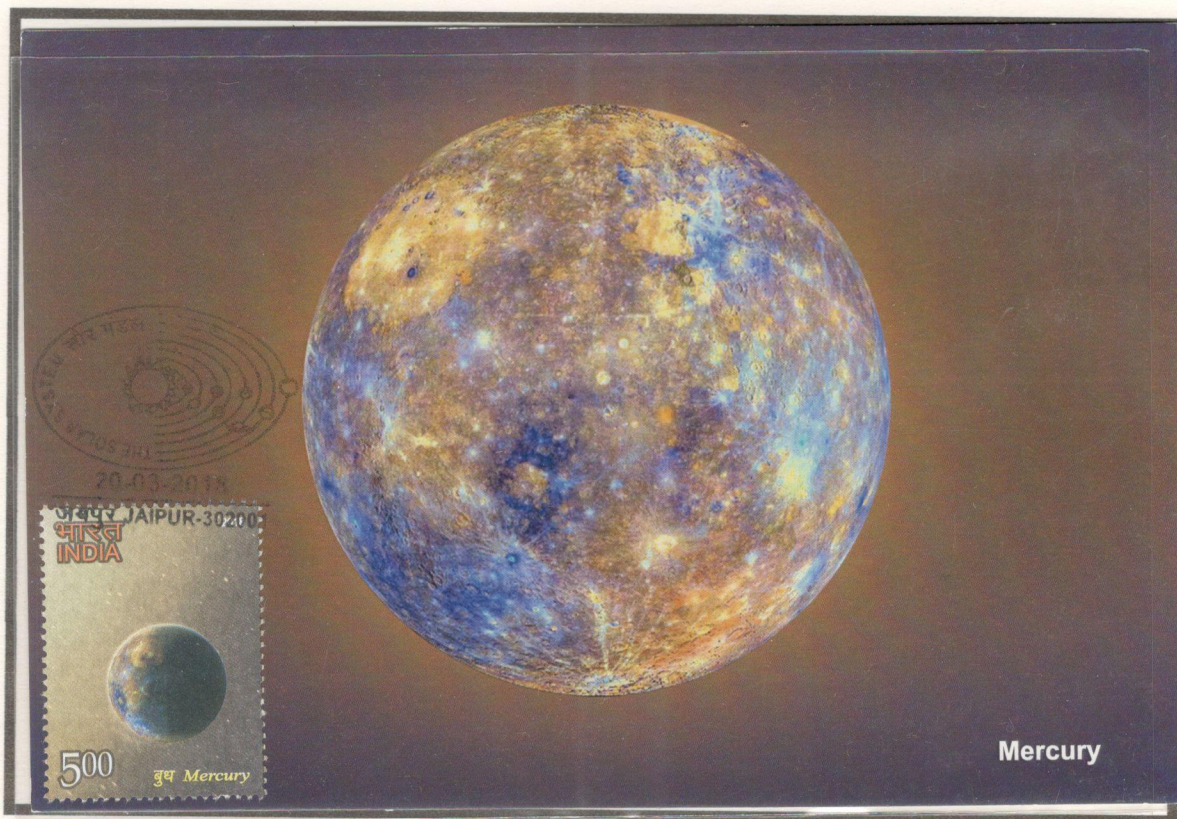
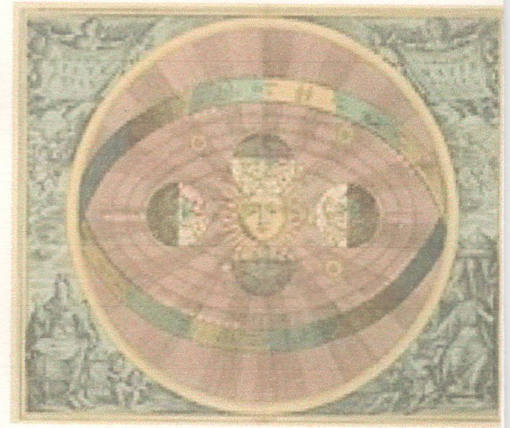


The Solar System formed 4.6 billion years ago from the gravitational collapse of a giant interstellar molecular cloud. The vast majority of the system's mass is in the Sun, with the majority of the remaining mass contained in Jupiter. The four smaller inner planets, Mercury, Venus, Earth and Mars, are terrestrial planets, being primarily composed of rock and metal. The four outer planets are giant planets, being substantially more massive than the terrestrials. The two largest, Jupiter and Saturn, are gas giants, being composed mainly of hydrogen and helium; the two outermost planets, Uranus and Neptune, are ice giants being composed mostly of substances with relatively high melting points compared with hydrogen and helium, called volatiles, such as water, ammonia and methane. All eight planets have almost circular orbits that lie within a nearly flat disc called the ecliptic.

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13	Uranus	13/16	1
14	Neptune	14/16	1
15	Centaur	15/16	1
16	Comets	16/16	1
TOTAL NO OF SHEETS			16

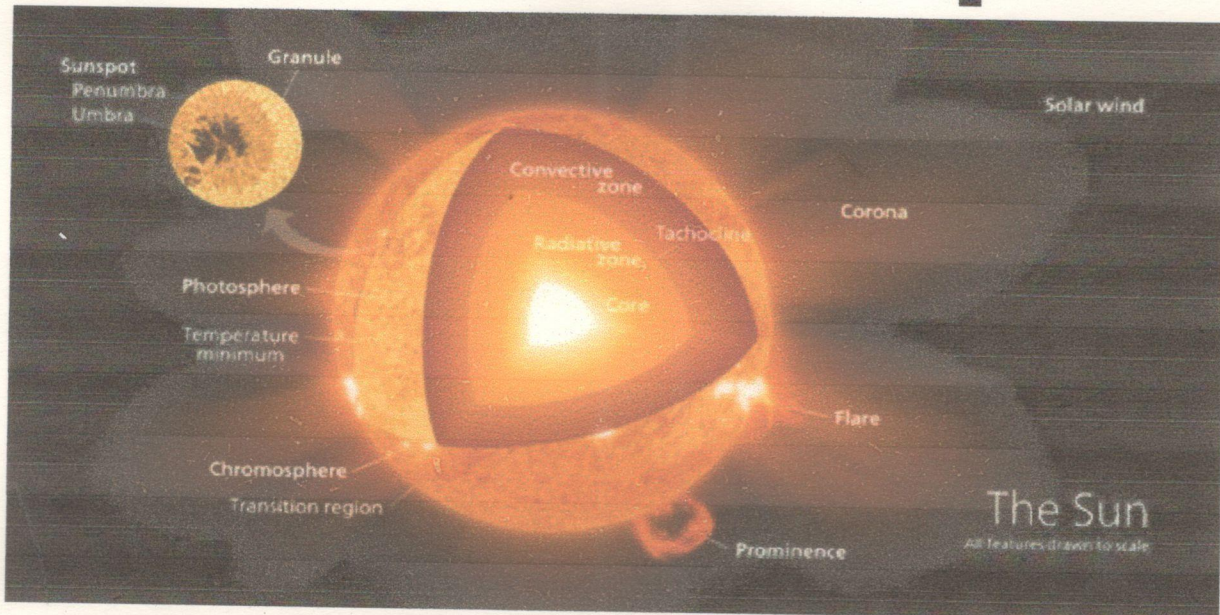
Discovery and Exploration



Mercury

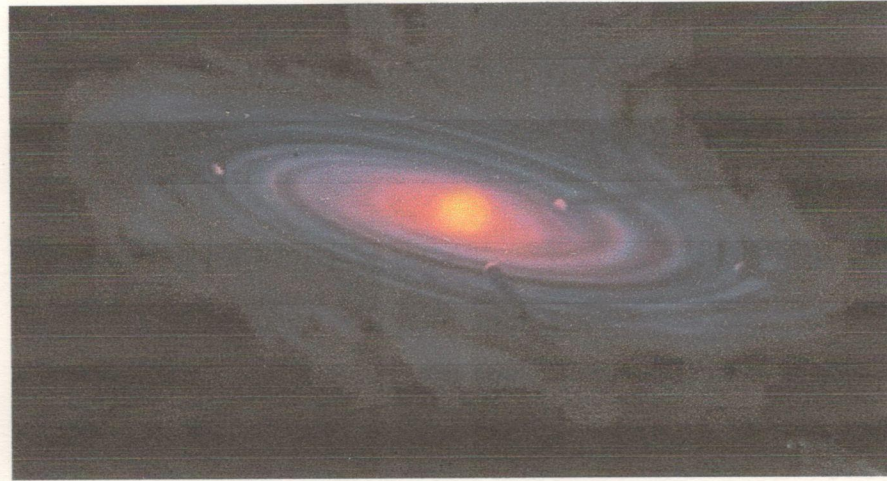
For most of history, humanity did not recognize or understand the concept of the Solar System. Most people up to the Late Middle Ages–Renaissance believed Earth to be stationary at the centre of the universe and categorically different from the divine or ethereal objects that moved through the sky. Although the Greek philosopher Aristarchus of Samos had speculated on a heliocentric reordering of the cosmos, Nicolaus Copernicus was the first to develop a mathematically predictive heliocentric system.

Structure & Composition



The principal component of the Solar System is the Sun, a G2 main-sequence star that contains 99.86% of the system's known mass and dominates it gravitationally. The Sun's four largest orbiting bodies, the giant planets, account for 99% of the remaining mass, with Jupiter and Saturn together comprising more than 90%. The remaining objects of the Solar System (including the four terrestrial planets, the dwarf planets, moons, asteroids, and comets) together comprise less than 0.002% of the Solar System's total mass.

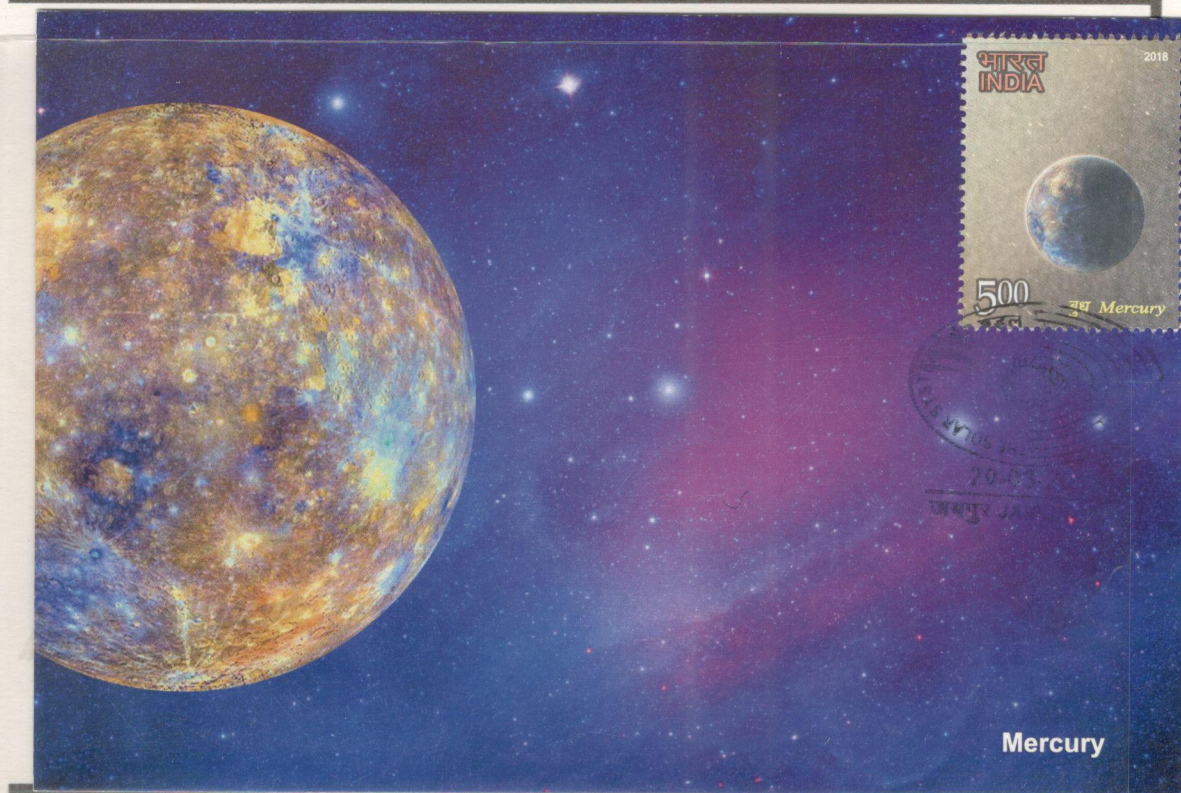
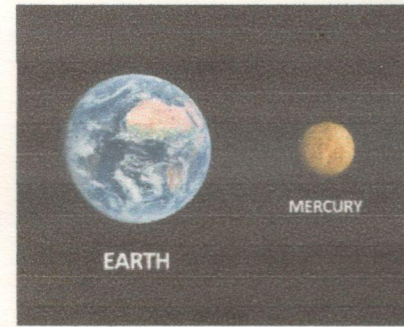
Formation & Evolution



The Solar System formed 4.568 billion years ago from the gravitational collapse of a region within a large molecular cloud. This initial cloud was likely several light-years across and probably birthed several stars.

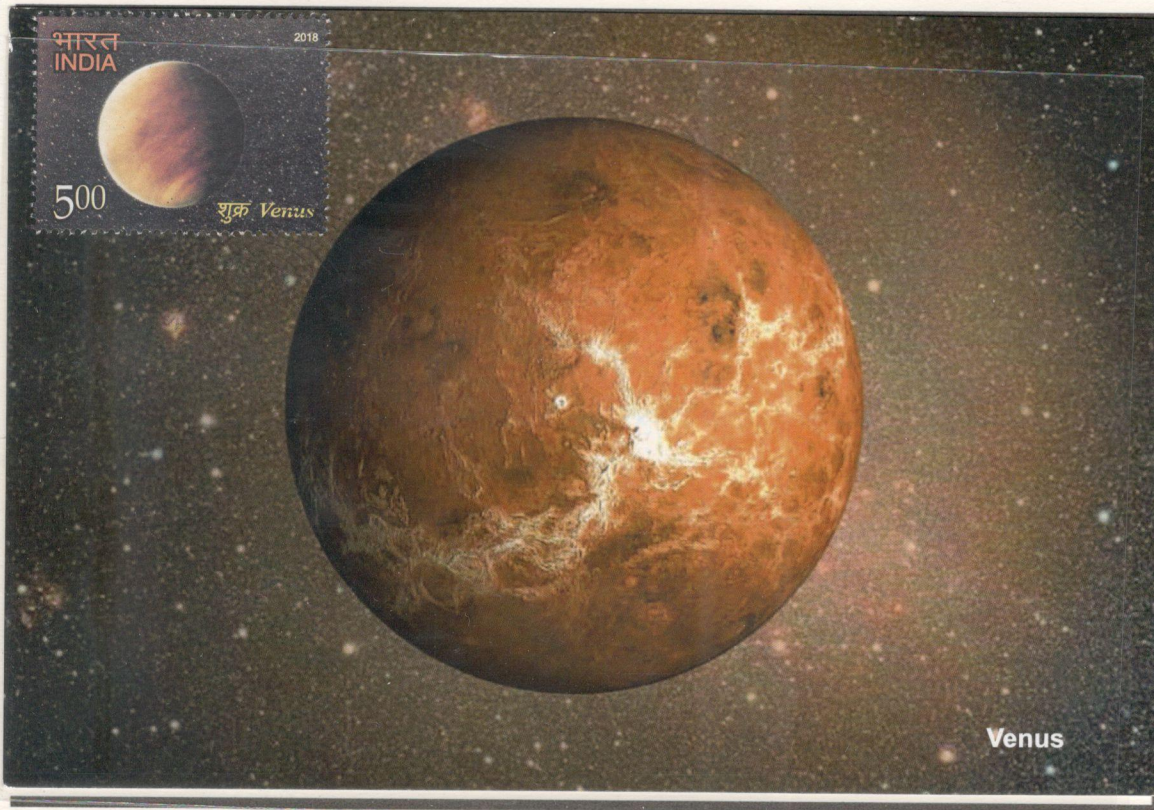
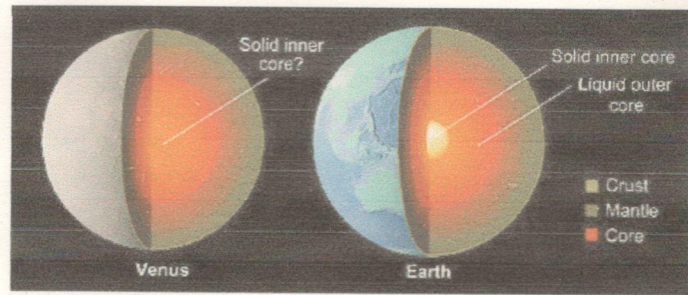
As is typical of molecular clouds, this one consisted mostly of hydrogen, with some helium, and small amounts of heavier elements fused by previous generations of stars. As the region that would become the Solar System, known as the pre-solar nebula, collapsed, conservation of angular momentum caused it to rotate faster.

MERCURY



Mercury is the closest planet to the Sun and on average, all seven other planets. The smallest planet in the Solar System ($0.055 M_{\oplus}$), Mercury has no natural satellites. Besides impact craters, its only known geological features are lobed ridges or rupes that were probably produced by a period of contraction early in its history. Mercury's very tenuous atmosphere consists of atoms blasted off its surface by the solar wind. Its relatively large iron core and thin mantle have not yet been adequately explained. Hypotheses include that its outer layers were stripped off by a giant impact, or that it was prevented from fully accreting by the young Sun's energy.

Venus



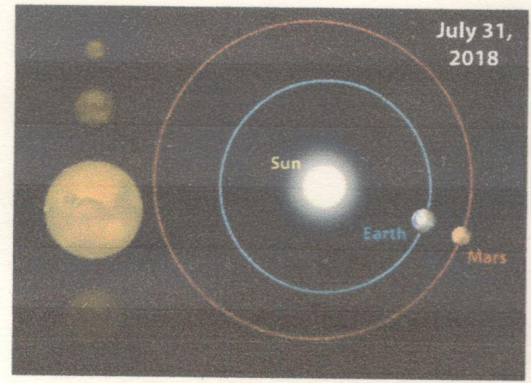
Venus (0.7 AU from the Sun) is close in size to Earth ($0.815 M_{\oplus}$) and, like Earth, has a thick silicate mantle around an iron core, a substantial atmosphere, and evidence of internal geological activity. It is much drier than Earth, and its atmosphere is ninety times as dense. Venus has no natural satellites. It is the hottest planet, with surface temperatures over 400°C (752°F), most likely due to the amount of greenhouse gases in the atmosphere. No definitive evidence of current geological activity has been detected on Venus, but it has no magnetic field that would prevent depletion of its substantial atmosphere, which suggests that its atmosphere is being replenished by volcanic eruptions.

Earth



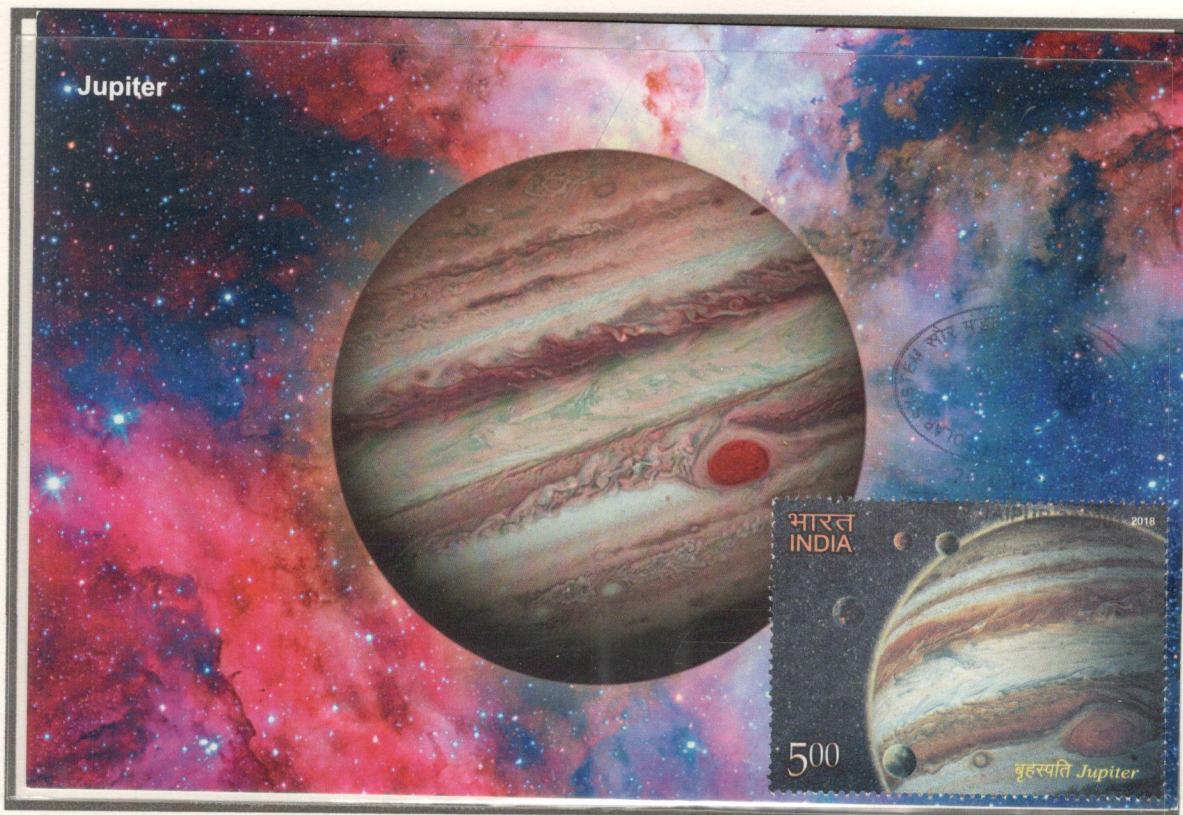
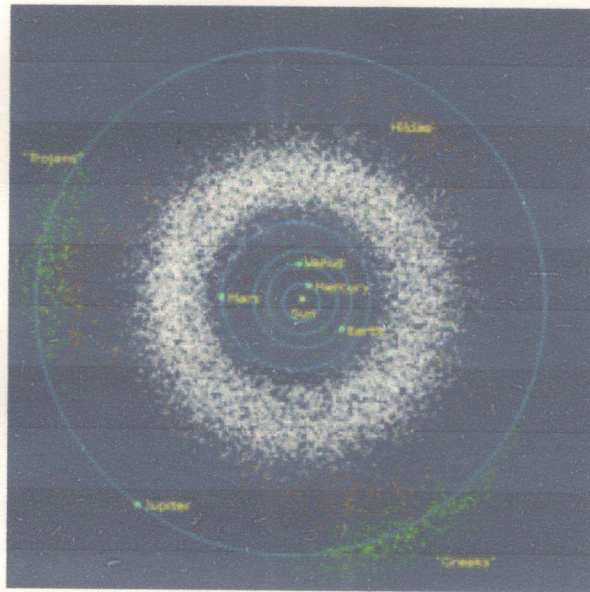
Earth (1 AU from the Sun) is the largest and densest of the inner planets, the only one known to have current geological activity, and the only place where life is known to exist. Its liquid hydrosphere is unique among the terrestrial planets, and it is the only planet where plate tectonics has been observed. Earth's atmosphere is radically different from those of the other planets, having been altered by the presence of life to contain 21% free oxygen. It has one natural satellite, the Moon, the only large satellite of a terrestrial planet in the Solar System.

Mars



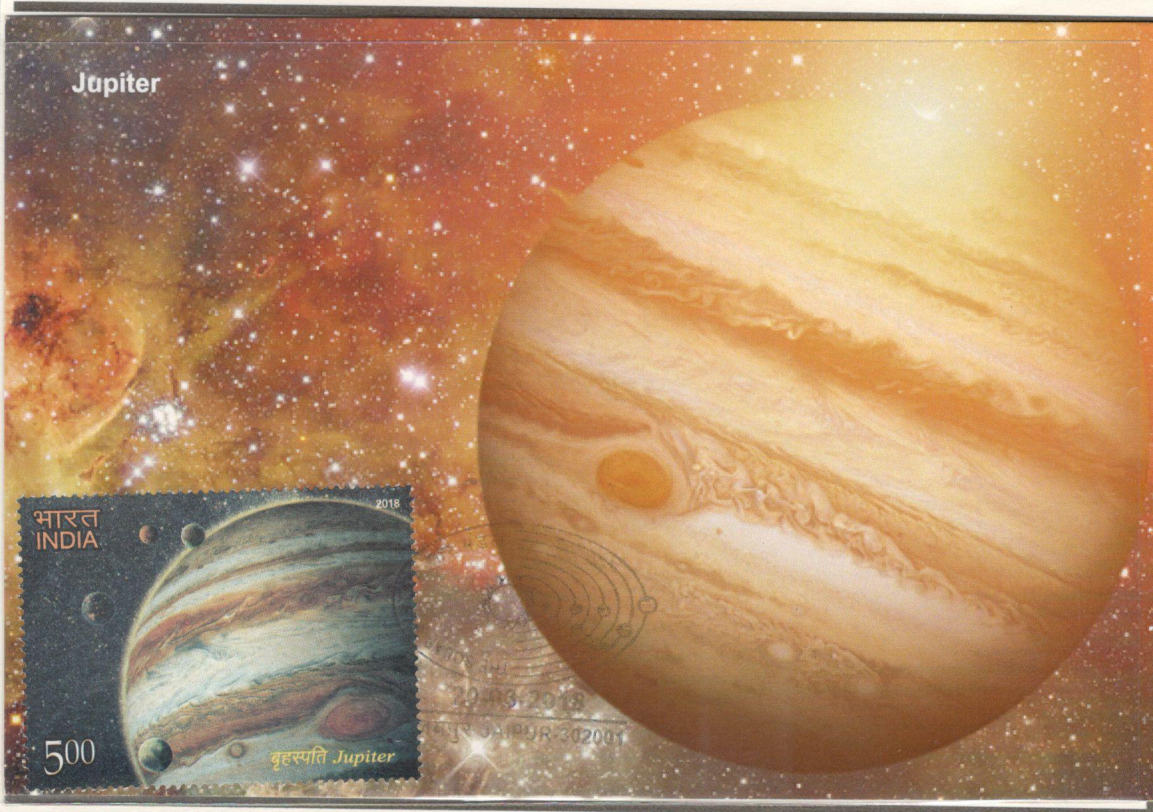
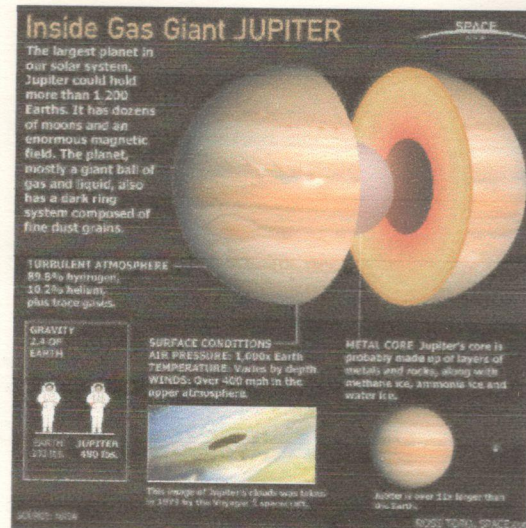
Mars (1.5 AU from the Sun) is smaller than Earth and Venus ($0.107 M_{\oplus}$). It has an atmosphere of mostly carbon dioxide with a surface pressure of 6.1 millibars (roughly 0.6% of that of Earth). Its surface, peppered with vast volcanoes, such as Olympus Mons, and rift valleys, such as Valles Marineris, shows geological activity that may have persisted until as recently as 2 million years ago. Its red colour comes from iron oxide (rust) in its soil. Mars has two tiny natural satellites (Deimos and Phobos) thought to be either captured asteroids, or ejected debris from a massive impact early in Mars's history.

Asteroid Belt



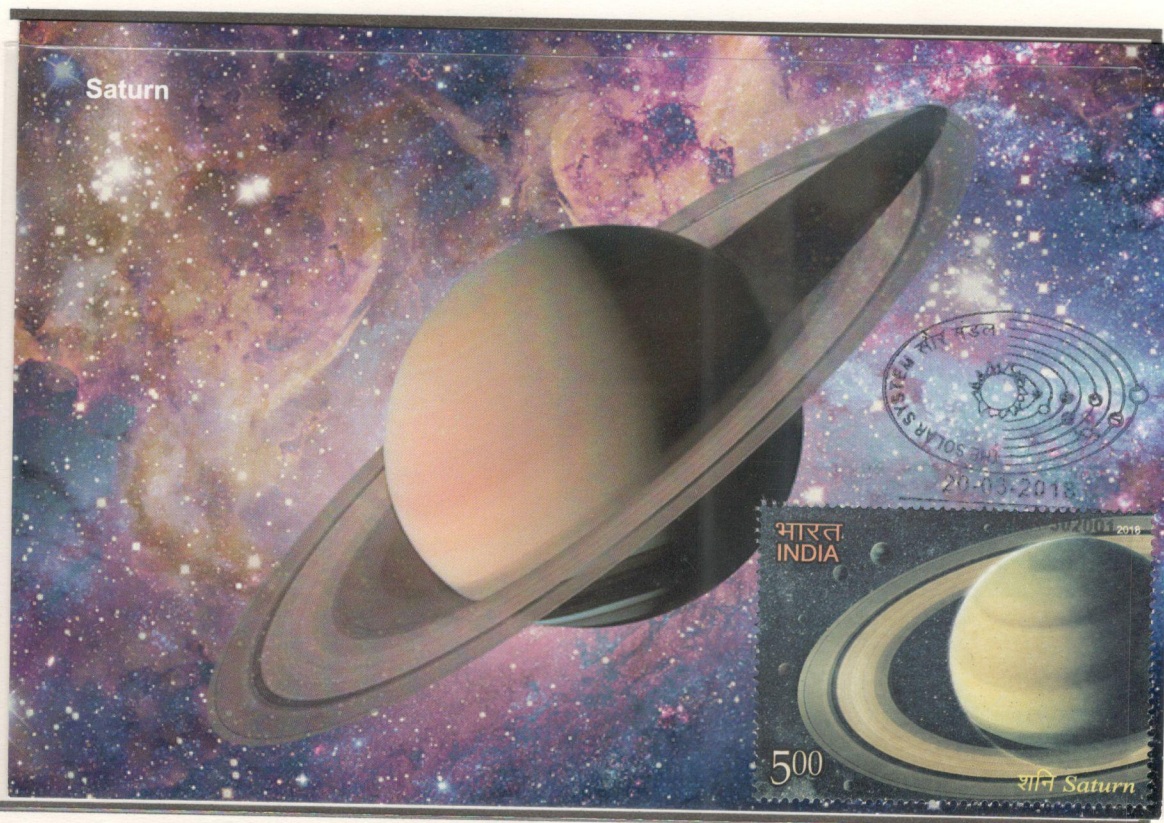
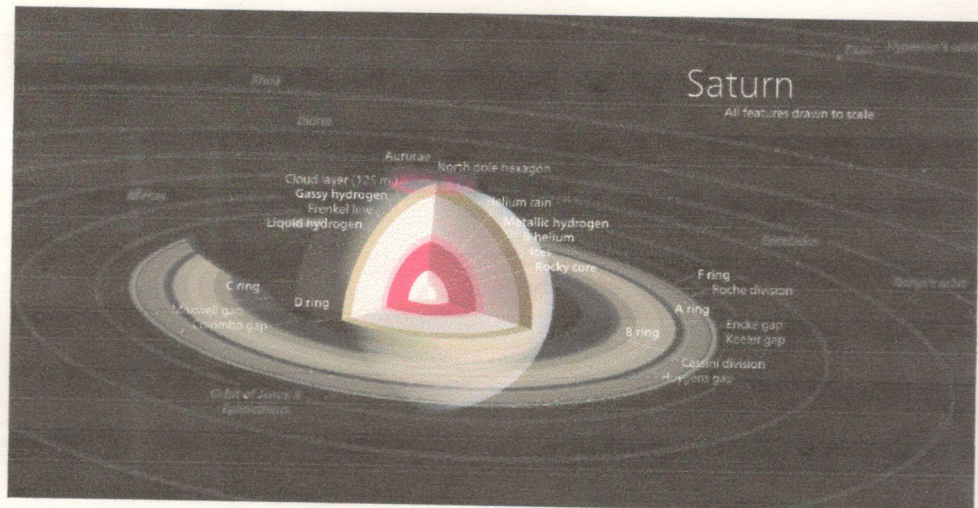
Asteroids except for the largest, Ceres, are classified as small Solar System bodies[e] and are composed mainly of refractory rocky and metallic minerals, with some ice. They range from a few metres to hundreds of kilometres in size. Asteroids smaller than one meter are usually called meteoroids and micrometeoroids (grain-sized), depending on different, somewhat arbitrary definitions.

Jupiter



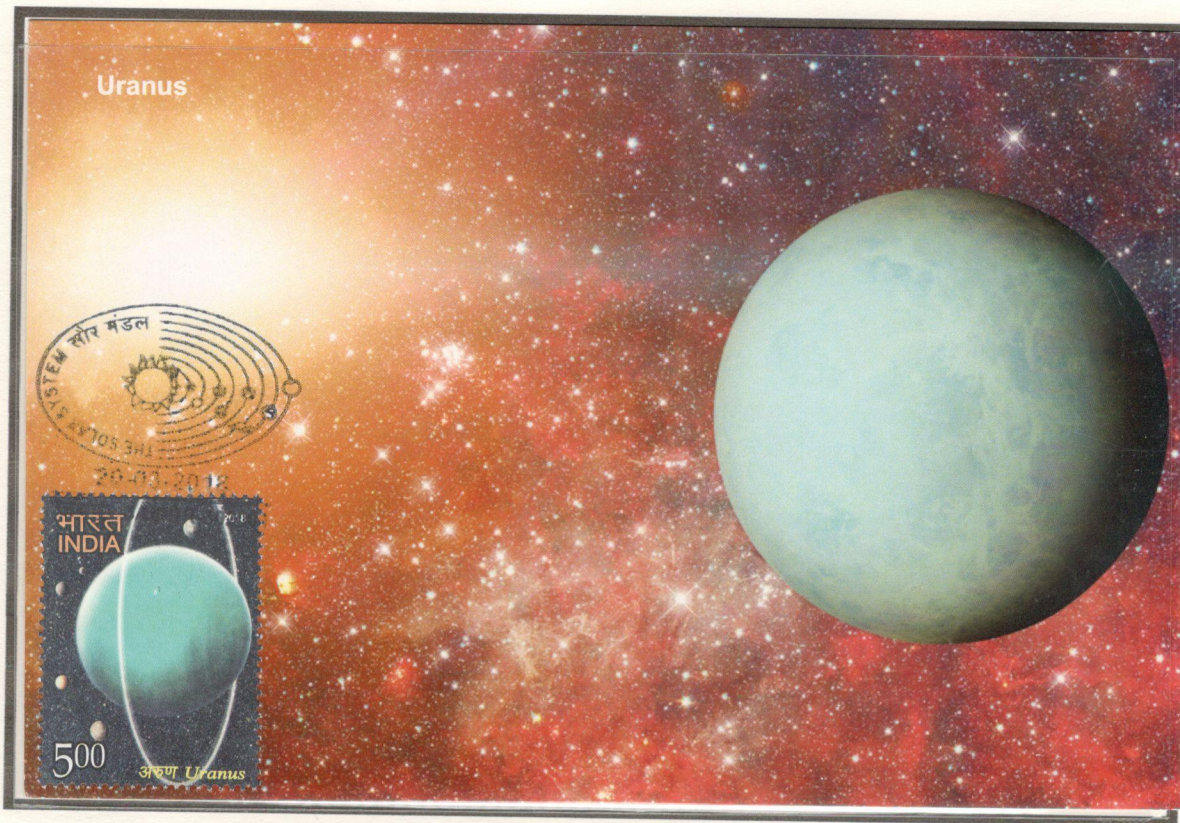
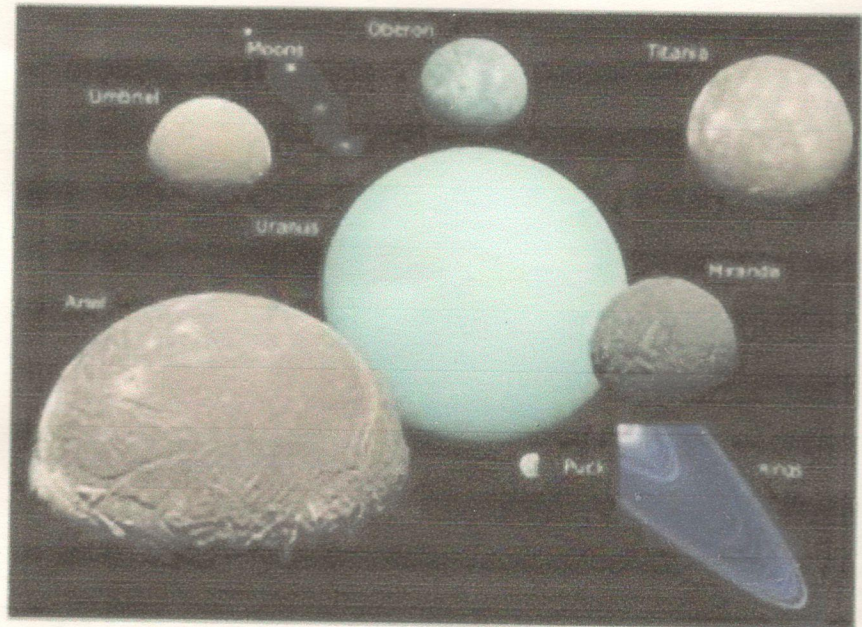
Jupiter (5.2 AU), at $318 M_{\oplus}$, is 2.5 times the mass of all the other planets put together. It is composed largely of hydrogen and helium. Jupiter's strong internal heat creates semi-permanent features in its atmosphere, such as cloud bands and the Great Red Spot. Jupiter has 79 known satellites. The four largest, Ganymede, Callisto, Io, and Europa, show similarities to the terrestrial planets, such as volcanism and internal heating. Ganymede, the largest satellite in the Solar System, is larger than Mercury.

Saturn



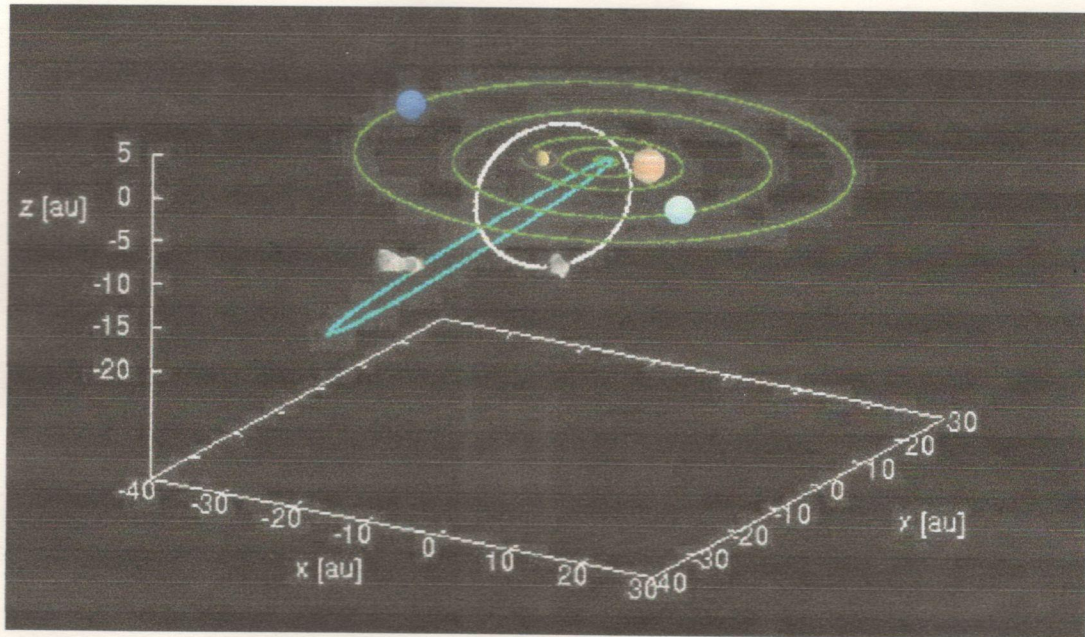
Saturn is the only planet of the Solar System that is less dense than water. The rings of Saturn are made up of small ice and rock particles. Saturn has 62 confirmed satellites composed largely of ice. Two of these, Titan and Enceladus, show signs of geological activity. Titan, the second-largest moon in the Solar System, is larger than Mercury and the only satellite in the Solar System with a substantial atmosphere.

Uranus



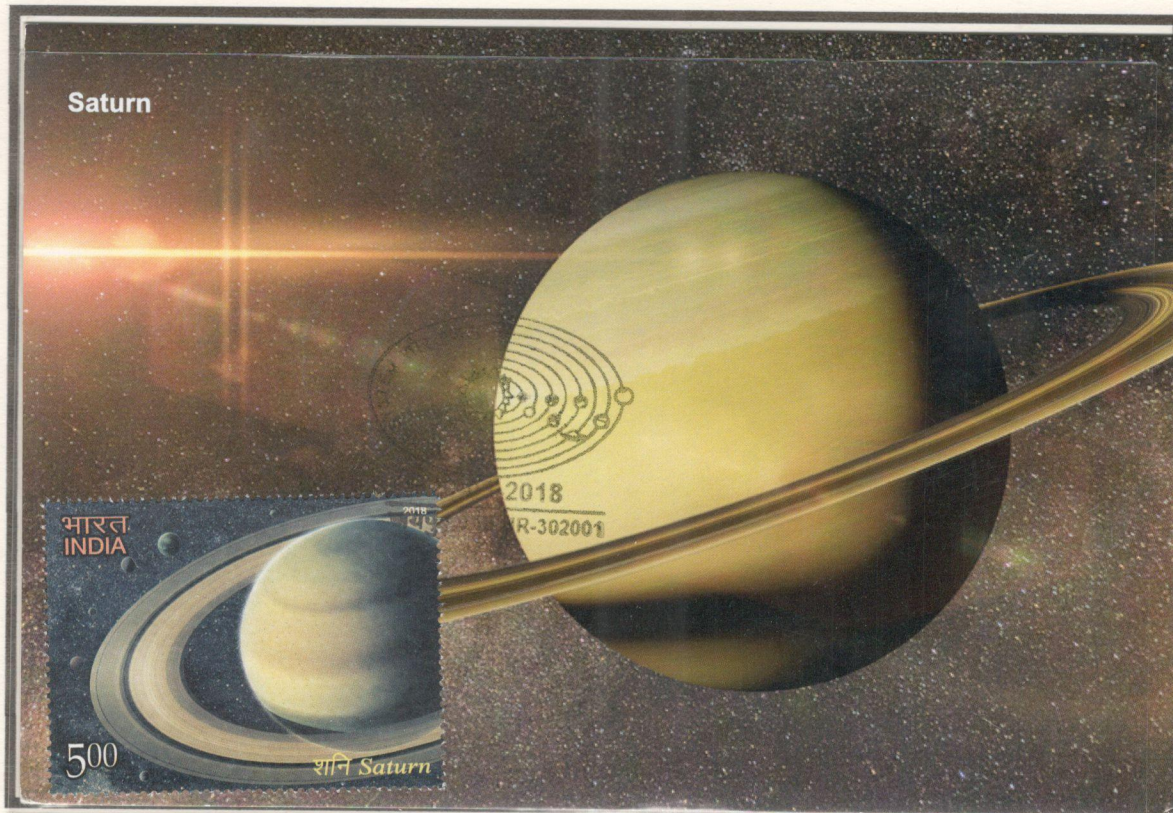
Uranus (19.2 AU), at $14 M_{\oplus}$, is the lightest of the outer planets. Uniquely among the planets, it orbits the Sun on its side; its axial tilt is over ninety degrees to the ecliptic. It has a much colder core than the other giant planets and radiates very little heat into space. Uranus has 27 known satellites, the largest ones being Titania, Oberon, Umbriel, Ariel, and Miranda.

Centaur



The centaurs are icy comet-like bodies whose orbits have semi-major axes greater than Jupiter's (5.5 AU) and less than Neptune's (30 AU). The largest known centaur, 10199 Chariklo, has a diameter of about 250 km. The first centaur discovered, 2060 Chiron, has also been classified as comet (95P) because it develops a coma just as comets do when they approach the Sun.

Comets



Comets are small Solar System bodies, typically only a few kilometres across, composed largely of volatile ices. They have highly eccentric orbits, generally a perihelion within the orbits of the inner planets and an aphelion far beyond Pluto. When a comet enters the inner Solar System, its proximity to the Sun causes its icy surface to sublime and ionise, creating a coma: a long tail of gas and dust often visible to the naked eye.