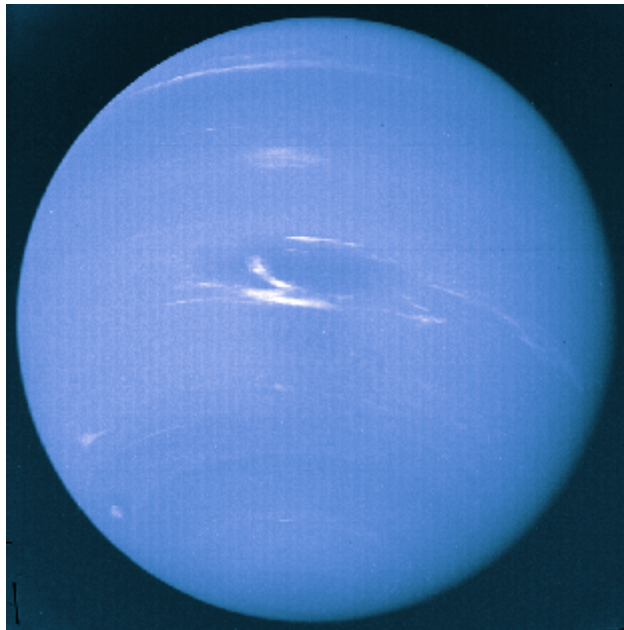


# Neptune



NEPTUNE is the eighth planet and has an equatorial diameter of 49,500 kilometres. If Neptune were hollow, it could contain nearly 60 Earths. Neptune orbits the Sun every 164.8 years and has thirteen moons, six of which were found by Voyager. A day on Neptune is 16 hours and 6.7 minutes. Neptune was discovered on September 23, 1846 by Johann Gottfried Galle, of the Berlin Observatory, and Louis d'Arrest, an astronomy student, through mathematical predictions made by Urbain Jean Joseph Le Verrier.

The first two thirds of Neptune is composed of a mixture of molten rock, water, liquid ammonia and methane. The outer third is a mixture of heated gases comprised of hydrogen, helium, water and methane.

Methane gives Neptune its blue cloud colour. Neptune is a dynamic planet with several large, dark spots reminiscent of Jupiter's hurricane-like storms. The largest spot, known as the Great Dark Spot, is about the size of the Earth and is similar to the Great Red Spot on Jupiter. Voyager revealed a small, irregularly shaped, eastward-moving cloud scooting around Neptune every 16 hours or so. This scooter as it has been dubbed could be a plume rising above a deeper cloud deck.

Long bright clouds, similar to cirrus clouds on Earth, were seen high in Neptune's atmosphere. At low northern latitudes, Voyager captured images of cloud streaks casting their shadows on cloud decks below.

The strongest winds on any planet were measured on Neptune. Most of the winds there blow westward, opposite to the rotation of the planet. Near the Great Dark Spot, winds blow up to 2,000 kilometres an hour.

Neptune has a set of four rings which are narrow and very faint. The rings are made up of dust particles thought to have been made by tiny meteorites smashing into Neptune's moons. From ground based telescopes the rings appear to be arcs but from Voyager 2 the arcs turned out to be bright spots or clumps in the ring system. The exact cause of the bright clumps is unknown.

The magnetic field of Neptune, like that of Uranus, is highly tilted at 47 degrees from the rotation axis and offset at least 0.55 radii (about 13,500 kilometres) from the physical centre. Comparing the magnetic fields of the two planets, scientists think the extreme orientation may be characteristic of flows in the interior of the planet and not the result of that planet's sideways orientation or of any possible field reversals at either planet.

Neptune has 13 known moons the most recent three were announced in January 2003.

One of them, Triton, has a tenuous atmosphere of nitrogen and at nearly 2,740 kilometres in diameter is larger than Pluto. Because Triton is moving in a retrograde orbit backward in relation to the planet's spin there has been some suggestion that Neptune may actually have captured it in the distant past. Astronomers with access to a telescope of 300mm or more might even be able to get a glimpse of Triton, very close to Neptune itself.

## Planet Data

Mass (kg)  $1.02 \times 10^{26} = 17.4M_E$

Diameter (km) 49,528 =  $0.382D_E$

Mean density (kg/l) 1.64 (Water = 1.0)

Average distance from Sun 30.07 AU (4,498,252,900 km)

Rotation period (length of day in Earth days) 0.67 (16.1 hours)

Revolution period (length of year in Earth years) 164.8

Obliquity (tilt of axis degrees) 29.0

Orbit inclination (degrees) 1.77

Orbit eccentricity (deviation from circular) 0.009

Mean temperature 48°K or -214°C

Atmospheric components 80% hydrogen, 19% helium, 1% methane, ethane, hydrogen deuteride

## Observing Neptune

From Earth, Neptune's apparent magnitude varies little, from 7.8 to 7.9 magnitude. That's because of its near perfectly circular orbit and its vast distance from Earth. The 300 million km difference in distance when Earth is on the same or opposite side of the Sun to Neptune has little effect on it.

That means although Neptune is too faint for the naked eye, it is actually visible in 50mm aperture binoculars which can reach to 9th magnitude. Naturally, a telescope of over 50mm aperture will make it even more accessible. The trick is to recognize Neptune from the other background stars in that part of the sky. It's not that easy.

Ideally Neptune should not twinkle like the stars but it is so far away and so small in angular size (2.2" to 2.3") that it looks like a star. The famous bluish colouring is not that obvious as a point object. If you defocus slightly to blur the image, the blue becomes a bit more discernable.

To locate Neptune, you need a detailed star chart with Neptune's position indicated as it varies with the date. The helpful fact is that it isn't moving across the sky all that quickly. At the moment it is in the constellation Aquarius and expected to stay there for a number of years yet. Neptune was discovered in September 1846 in Capricornus and as its orbital period (or year) is 164.8 years, it returned to its point of discovery in about July 2011. Since then, it has moved on. It will return to Capricornus again in around 2165 CE.

If you have a computer star chart program or a magazine Neptune chart, you can identify the details of the area of sky Neptune is in and do some star hopping to find it.