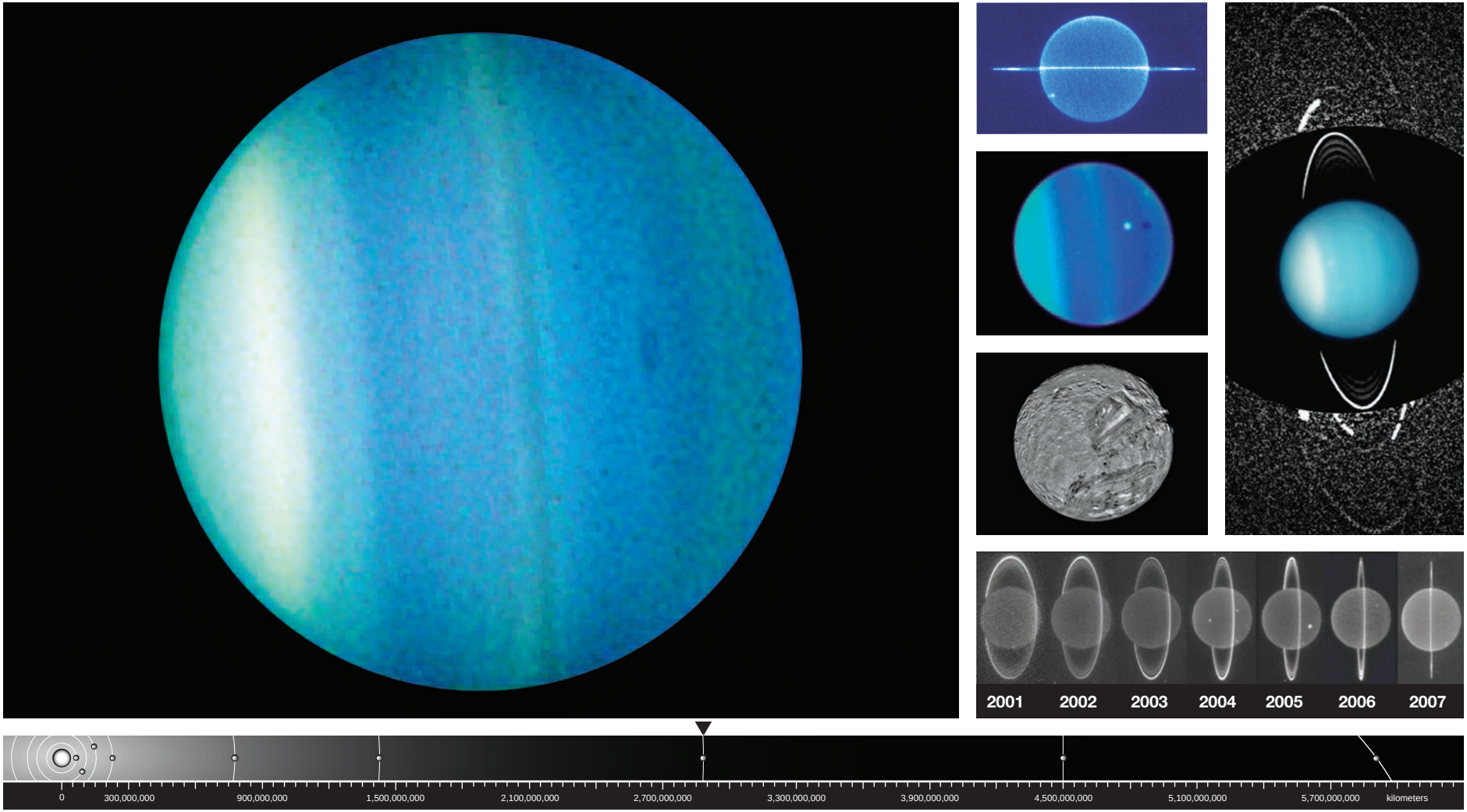
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kilometers

Uranus

The first planet found with the aid of a telescope, Uranus discovered in 1781 by astronomer William Herschel, alth originally thought it was a comet or star. The seventh pla the Sun is so distant that it takes 84 years to complete o

Like Venus, Uranus rotates east to west. Uranus' rotatior tilted almost parallel to its orbital plane, so Uranus appea rotating on its side. This situation may be the result of a with a planet-sized body early in the planet's history, whi parently radically changed Uranus' rotation. Because of unusual orientation, the planet experiences extreme variations in sunlight during each 20-year-long season.

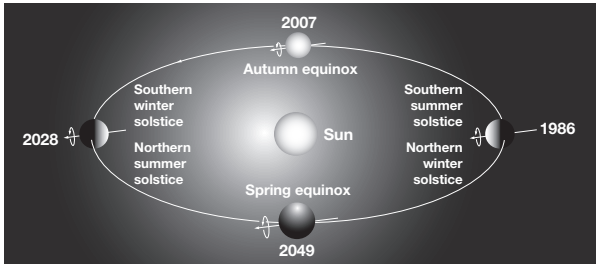
Voyager 2, the only spacecraft to visit Uranus, imaged a bland-looking sphere in 1986. When Voyager flew by, the south pole of Uranus pointed almost directly at the Sun because Uranus was near its southern summer solstice, with the southern hemisphere bathed in continuous sunlight and the northern hemisphere radiating heat into the blackness of space.

Uranus reached equinox in December 2007, when it was fully illuminated as the Sun passed over the planet's equator. By 2028, the north pole will point directly at the Sun, a reversal of the situation when Voyager flew by. Equinox also brings ring-plane crossing, when Uranus' rings appear to move more and more edge-on as seen from Earth.

The Hubble Space Telescope and the Keck Observatory in Hawaii captured detailed images of Uranus as the planet approached equinox. While Voyager 2 saw only a few discrete clouds, more recent observations reveal that Uranus exhibits dynamic clouds as it approaches equinox, including rapidly evolving bright features and a new Great Dark Spot like those seen on Neptune.

Uranus is one of the two ice giants of the outer solar system (the other is Neptune). The atmosphere is mostly hydrogen and helium, with a small amount of methane and traces of water and ammonia. Uranus gets its blue-green color from methane gas in the atmosphere. Sunlight passes through the atmosphere and is reflected back out by Uranus' cloud tops. Methane gas absorbs the red portion of the light, resulting in a blue-green color. The bulk (80 percent or more) of the mass of Uranus is contained in an extended liquid core consisting mostly of icy materials (water, methane, and ammonia).

For nearly a quarter of the Uranian year (equal to 84 Earth years), the Sun shines directly over each pole, plunging the other half of the planet into a long, dark winter.



The varying positions of Uranus over its 20-year seasons.

While magnetic fields are typically in alignment with a planet's rotation, Uranus' magnetic field is tipped over: the magnetic axis is tilted nearly 60 degrees from the planet's axis of rotation, and is also offset from the center of the planet by one-third of the planet's radius. The magnetic fields of both Uranus and Neptune are very irregular.

Uranus has two sets of rings. The inner system of nine rings, discovered in 1977, consists mostly of narrow, dark rings. Voyager 2 found two additional inner rings. An outer system of two more-distant rings was discovered in Hubble Space Telescope images in 2003. In 2006, Hubble and Keck observations showed that the outer rings are brightly colored. Uranus has 27 known moons, named for characters from the works of William Shakespeare or Alexander Pope. Miranda is the strangest-looking Uranian moon: its complex surface may indicate partial melting of the interior, with icy material drifting to the surface.

FAST FACTS

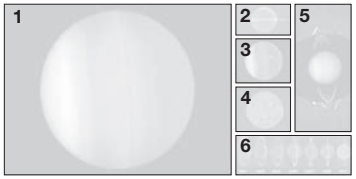
Namesake	Greek god of the heavens ("Ouranos")
Mean Distance from the Sun	2,870.97 million km (1,783.94 million mi)
Orbit Period	84.02 Earth years (30,687.2 Earth days)
Orbit Eccentricity (Circular Orbit = 0)	0.047168
Orbit Inclination to Ecliptic	0.770 deg
Inclination of Equator to Orbit	97.86 deg
Rotation Period	17.24 hours (retrograde)
Equatorial Radius	25,559 km (15,882 mi)
Mass	14.371 of Earth's
Density	1.32 g/cm^3
Gravity	8.43 m/sec^2 (27.7 ft/sec^2)
Atmosphere Primary Components	hydrogen, helium
Effective Temperature	–216 deg C (–357 deg F)
Known Moons*	27
Known Rings	13 (Zeta, Six, Five, Four, Alpha, Beta, Eta, Gamma, Delta, Lambda, Epsilon, Nu, Mu)

*As of July 2013.

SIGNIFICANT DATES

1781 — Astronomer William Herschel discovers Uranus.
1787–1851 — Four Uranian moons are discovered and named Titania, Oberon, Ariel, and Umbriel.
1948 — Another moon, Miranda, is discovered.
1977 — Scientists discover nine faint rings of Uranus while observing a distant star pass behind the planet.
1986 — Voyager 2 discovers 10 moons and two additional rings during its historic flyby.
1997–2005 — Astronomers discover more tiny moons.
2003–2005 — The Hubble Space Telescope images two delicate rings far from the planet, and two new moons.
2007 — Uranus reaches equinox.

ABOUT THE IMAGES



1 This 2006 image taken by the Hubble Space Telescope shows bands and a new "dark spot" in Uranus' atmosphere.

2 This infrared image of the dark side of the rings was taken by the Keck Observatory in 2007. The rings are visible because the widely separated ring particles scatter sunlight from the sunlit side of the planet to the dark side. The image is rotated 90 degrees.

3 Uranus' moon Ariel (white dot) and its shadow (black dot) were caught crossing the face of Uranus in this Hubble Space Telescope image.

4 Uranus' moon Miranda as seen by Voyager 2.

5 This Hubble composite image shows two very faint outer rings revealed in 2003. The very bright streaks in the outer ring system are moons, their images smeared out by the long exposure.

6 Keck Observatory infrared images show how Uranus and its rings changed, as viewed from Earth, from 2001–2007. The south pole is at the left in the images.

FOR MORE INFORMATION

solarsystem.nasa.gov/uranus

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