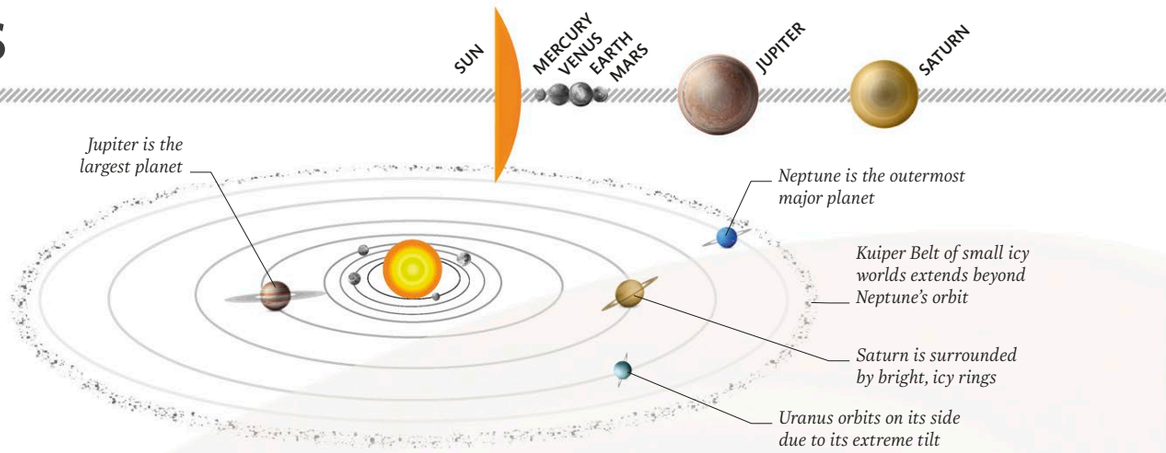
Giant planets

The outer planets

The four giant worlds of the outer Solar System – Jupiter, Saturn, Uranus, and Neptune – travel along widely spaced orbits beyond the Asteroid Belt that separates them from the inner planets. Known as "gas giants", these planets formed in a region of the young Solar System filled with plentiful amounts of ice and gas, and the structure of each depends on their exact composition.

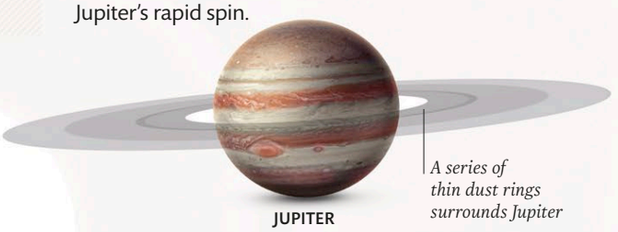


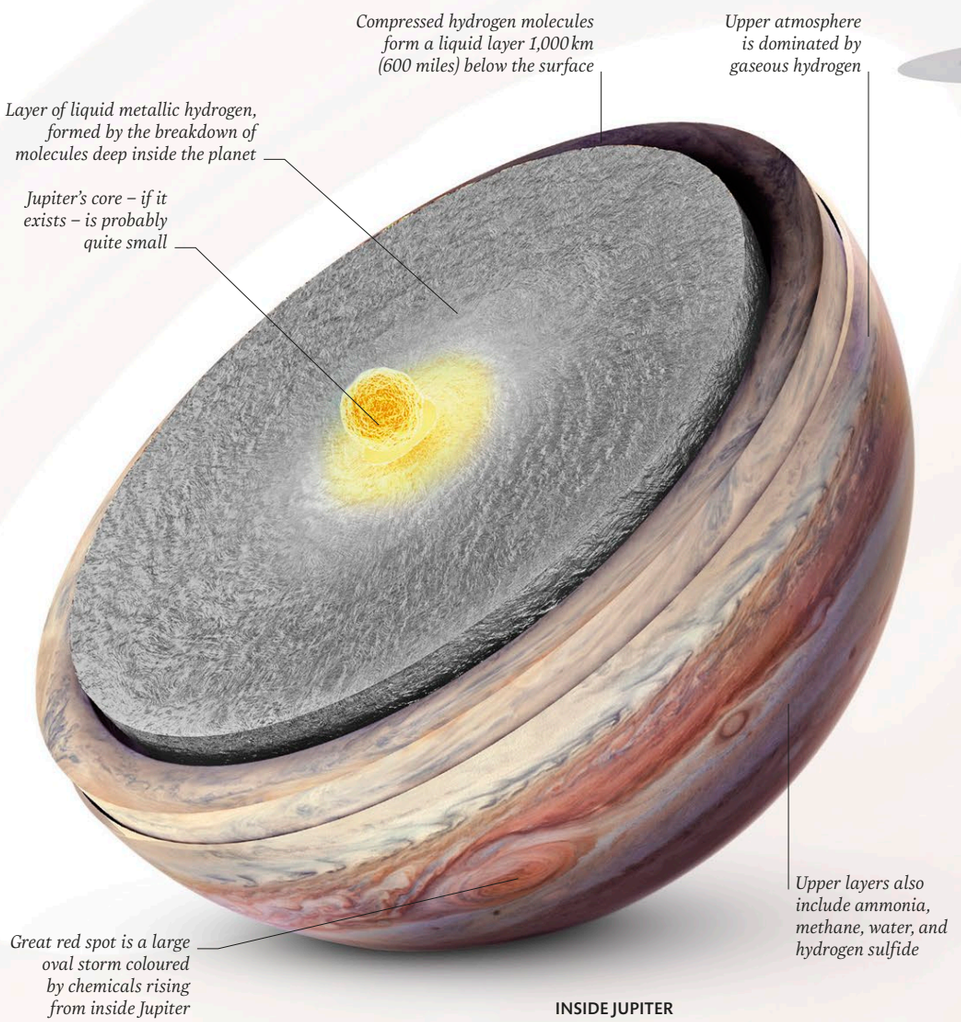
JUPITER'S MOONS

Jupiter has at least 79 satellites – and four of them are among the biggest moons in the Solar System. Jupiter's immense gravity heats their interiors, and also powers volcanic activity both on Io, and beneath Europa's icy crust.

Jupiter

Large enough to consume more than 1,300 Earths, Jupiter is composed primarily of hydrogen – the lightest and simplest element. Clouds in the upper atmosphere are coloured by other chemicals, and wrapped into bands running parallel to the equator by Jupiter's rapid spin.



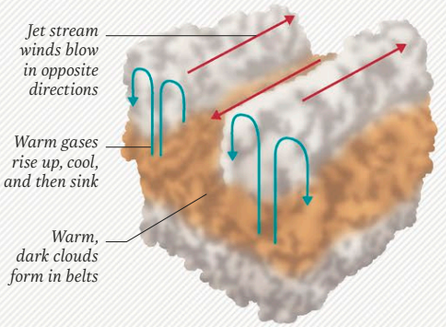


INSIDE JUPITER

Equatorial diameter	142,984 km (88,846 miles)
Mass (Earth = 1)	318
Gravity at equator (Earth = 1)	2.4
Mean distance from Sun (Earth = 1)	5.20
Axial tilt	3.13°
Rotation period (day)	9.93 hours
Orbital period (year)	11.86 Earth years
Cloud-top temperature	–145°C (–234°F)
Moons	79+

CONVECTION CYCLE

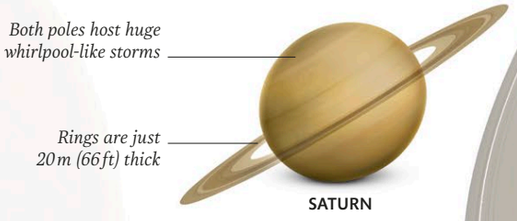
Jupiter's cloud bands consist of high-altitude, light-coloured "zones", and darker brownish "belts" lower in the atmosphere. The colours are caused by chemicals condensing at different temperatures and altitudes.



◂ see also The Cosmos pp.12–13 ◂ Rocky planets pp.14–15 Small worlds pp.18–19 ▸

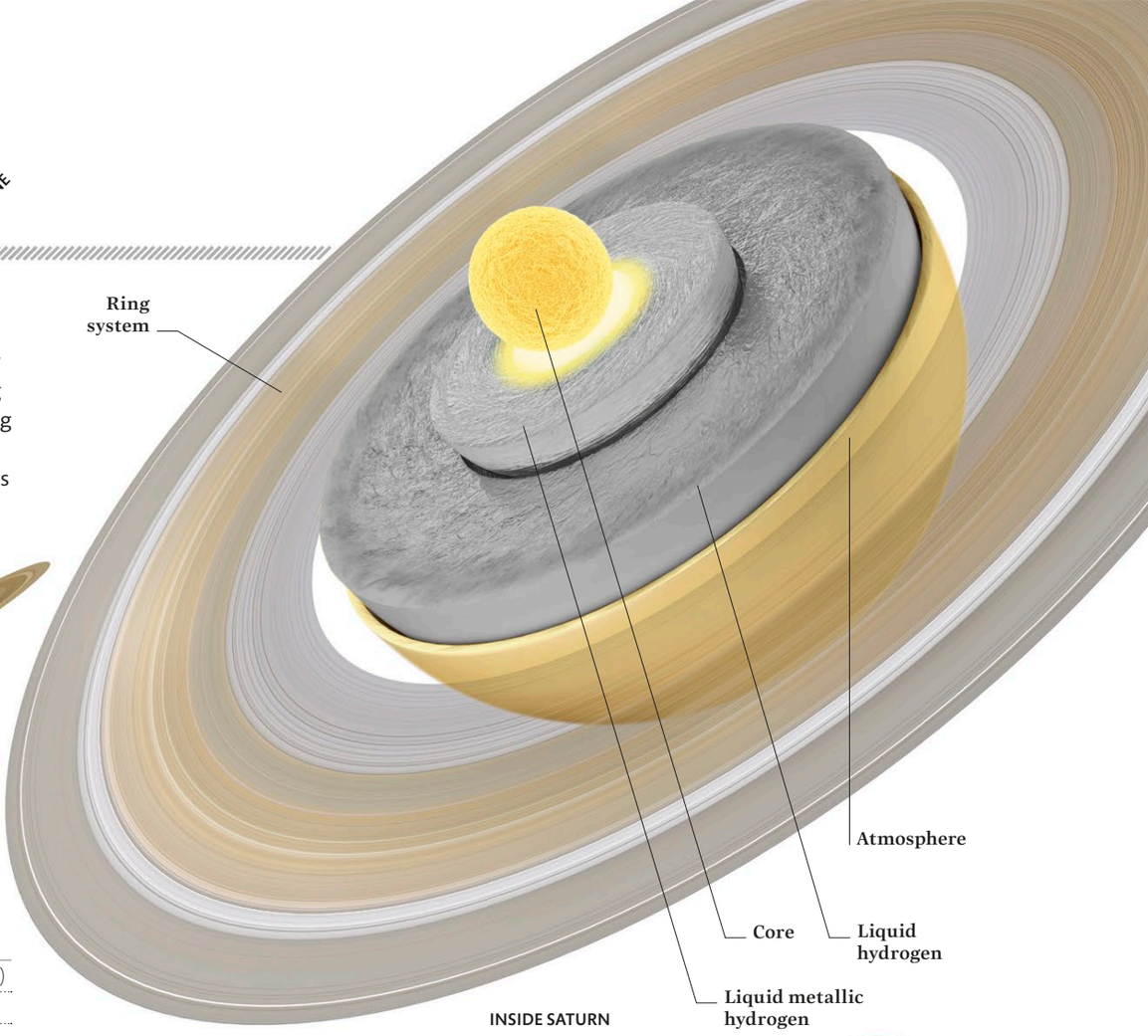
Saturn

Creamy clouds in Saturn's upper atmosphere conceal stormy conditions beneath. Weaker gravity than Jupiter allows its outer layers to expand, giving the planet a lower average density than water. A ring system consisting of trillions of icy particles, each following its own circular orbit, form narrow ringlets arranged in broad bands around Saturn's equator.



Saturn's **lightning** has 10,000 times the power of lightning on Earth

Equatorial diameter	120,536 km (74,898 miles)
Mass (Earth = 1)	95.2
Gravity at equator (Earth = 1)	1.02
Mean distance from Sun (Earth = 1)	9.58
Axial tilt	26.7°
Rotation period (day)	10.7 hours
Orbital period (year)	29.46 Earth years
Cloud-top temperature	–250°C (–418°F)
Moons	82+

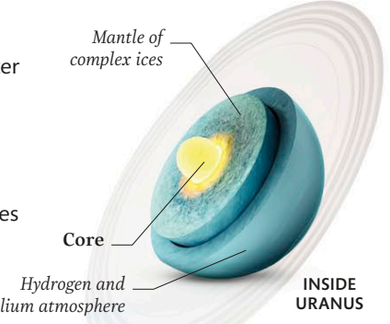


SATURN'S MOONS

Numerous and varied, Saturn's satellites include complex giants like Titan, and smaller Enceladus, which has lakes of liquid water below its surface.

Uranus

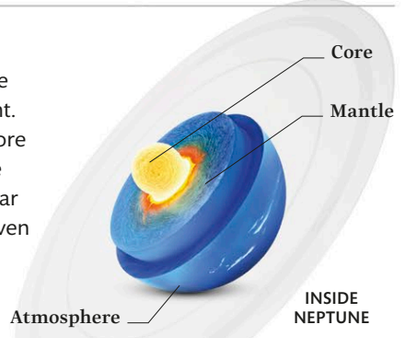
Smaller and denser than both Jupiter and Saturn, Uranus is an "ice giant" with an interior made up of slushy chemicals including water ice, ammonia, and methane. Tilting dramatically on its axis at 98 degrees to its orbit, the planet experiences extreme seasons as it completes its journey around the Sun.



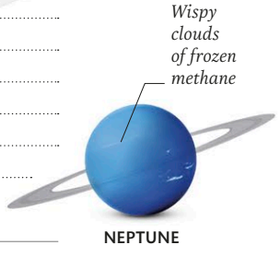
Equatorial diameter	51,118 km (31,763 miles)
Mass (Earth = 1)	14.5
Gravity at equator (Earth = 1)	0.89
Mean distance from Sun (Earth = 1)	19.2
Axial tilt	97.8°
Rotation period (day)	17.2 hours
Orbital period (year)	84.0 Earth years
Cloud-top temperature	–197°C (–323°F)
Moons	27

Neptune

The most distant planet from the Sun, Neptune is another ice giant. It is similar to Uranus but has more active weather – including some of the strongest winds in the Solar System. Neptune's activity is driven by heat from within the planet, produced by chemical changes around the core.



Equatorial diameter	49,528 km (30,775 miles)
Mass (Earth = 1)	17.1
Gravity at equator (Earth = 1)	1.1
Mean distance from Sun (Earth = 1)	30.1
Axial tilt	28.3°
Rotation period (day)	16.1 hours
Orbital period (year)	163.7 Earth years
Cloud-top temperature	–201°C (–330°F)
Moons	14



see also The Milky Way pp.26–27 ▶ The Universe pp.30–33 ▶