



# All About... SATURN

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A breathtaking and complex ring system, moons that might have the capacity to support life and awesome storms that rage at over 1,000mph. There's good reason why this beautiful planet is called the 'jewel' of the Solar System

# In the clouds

Saturn's atmosphere has some similarities to Jupiter's

The composition of Saturn's clouds depends on where you are in the atmosphere. The pressure increases and temperatures drop as you travel further down through the layers and towards the planet's core. At the upper cloud layer, the clouds are made up of ammonia ice, followed by water ice clouds with a layer of ammonium hydrosulphide ice mixed in, and then the bottom layer is ammonia mixed in water droplets.

Much like fellow gas giant Jupiter, Saturn has bands of clouds that are

divided into zones and belts. The zones are the lighter-coloured areas and the bands are darker, with the orange and reddish hues coming from sulphuric compounds. The darker clouds tend to be thinner and lower, while the lighter ones are denser and higher. The bands of clouds are named in the same way that Jupiter's are labelled, according to their locations in the northern or southern hemisphere of the planet. However, Saturn's cloud bands are very faint and more difficult to distinguish

from each other than Jupiter's. They also widen as they head towards the equator. We weren't able to clearly see the distinctions between some of the fainter bands until the Voyager probes flew by Saturn during the Eighties (although modern telescopes are able to see them).

Again, like Jupiter, Saturn has wind jets that alternate westwards and eastwards out from the equator. But Saturnian winds are fast. In fact, reaching maximum speeds of around 1,800 kilometres per hour (1,120 miles

per hour), they are the second fastest winds among the Solar System's planets after Neptune's.

Saturn also has some unusual qualities at each of its poles. The north polar vortex has a unique hexagon-shaped cloud pattern, with straight sides estimated to be about 13,800 kilometres (8,600 miles) long, and it appears to rotate at the same speed as the interior of the planet. Scientists are unsure why the clouds have formed this particular pattern. The south pole doesn't have the same

## Global picture of a gas giant

### Rings

The rings disappear into a thin line when Saturn is viewed straight-on.

### Equatorial Zone

The view of this zone on Saturn is bisected by its ring system, and the zone is wider than on Jupiter.

# Pioneer 11 - first to Saturn

## Helium Vector Magnetometer

The HVM was used to map the planet's magnetic field, as well as analysing interactions with the solar wind.

## Plasma Analyzer

Detects particles of plasma from the solar wind through the spacecraft's antenna.

## Mission Profile

### Pioneer 11

**Mission dates:** April 1973 to September 1995

**Goals:** Map Saturn's magnetic field; measure temperature and structure of its upper atmosphere; probe the ring system and observe Saturn's major satellites; obtain images of the planet and its ring and satellite systems; investigate the asteroid belt; explore the interplanetary medium

**Findings:** Discovered Saturn's F Ring; discovered the moon Epimetheus; recorded Saturn's temperature at an average of -180°C (-292°F); provided first images not taken from a telescope; showed that Saturn has a liquid hydrogen atmosphere

## Separation Ring

The Pioneer spacecraft were launched aboard a three-stage vehicle, which was attached at the ring.

## Asteroid-Meteor Detector

Uses four non-imaging telescopes to look for distant asteroids and meteors via their dust particles.

## Imaging Photopolarimeter

Captured images via telescope in narrow strips as the spacecraft swept along the planet, which were then put together into one image.

## RTGs

These Radioisotope Thermoelectric Generators provided power, as the heat from the decay of radioactive isotopes was converted into electricity.

"There are currently no plans for further exploration of Saturn"