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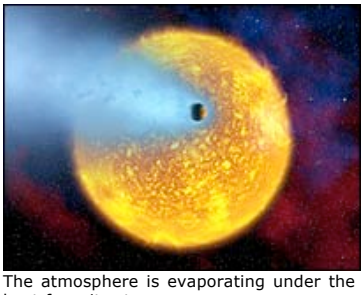
Water detected on distant planet

Water has been detected for the first time in the atmosphere of a planet outside our Solar System.


The atmosphere is evaporating under the heat from its star

The planet, known as HD 209458b, is a Jupiter-like gas giant located 150 light-years from Earth in the constellation Pegasus.

Scientists will publish the findings in the Astrophysical Journal.

However, another research team reported in February that they were unable to find evidence of water in this planet's atmosphere.

Water vapour (or steam) was expected to be present in atmospheres of most known extrasolar planets, even those that orbit more closely to their parent star than Mercury is to our Sun.

> **"Understanding the distribution of water in other solar systems is important for understanding whether or not conditions for life are possible"**
>
> Travis Barman

For the majority of exoplanets, their close proximity to their parent star has made detecting water and other compounds difficult.

The identification reported here takes advantage of the fact that HD209458b, as seen from Earth, passes directly in front of its star every three and half days.

As a planet passes in front of a star, its atmosphere blocks a different amount of starlight at different wavelengths of light.

In particular, absorption by water in the atmosphere of a giant planet makes the planet appear larger across a specific part of the infrared spectrum compared to wavelengths in the visible spectrum.

Cosmic puzzle

Astronomer Travis Barman, from the Lowell

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Observatory in Flagstaff, US, found what he says is strong evidence for water absorption in the atmosphere of the transiting planet.

The conclusions stemmed from an analysis of Hubble Space Telescope measurements by Harvard University astronomer Heather Knutson and new theoretical models developed by Dr Barman.

He said his findings provide good reason to believe other planets beyond our Solar System also have water vapour in their atmospheres, despite the failure by another group to find water on the same world.

"I'm very confident," said Dr Barman, "it's definitely good news because water has been predicted to be present in the atmosphere of this planet and many of the other ones for some time."

He added that a Jupiter-like gaseous planet such as this one, as opposed to a rocky one like Earth, is highly unlikely to harbour any kind of life.

"Certainly this is part of that puzzle - understanding the distribution of water in other solar systems is important for understanding whether or not conditions for life are possible," he explained.

Planet shine

Telescope technologies are being developed that will probe the very faint light from these objects for tell-tale signs of biology.

These are the same "life markers" known to be present in light reflected off the Earth - so-called "earthshine".

They include signatures for water, and gases such as oxygen and methane and perhaps more complex molecules such as chlorophyll - the pigment which makes the process of photosynthesis possible.

HD209458b belongs to a type of extrasolar planet known as "hot Jupiters". These planets orbit precariously close to their stars.

The planet's outer atmosphere is expanded and heated so much by the nearby star that it is escaping the planet's gravity. Hydrogen boils off in the upper atmosphere under the searing heat from the star.