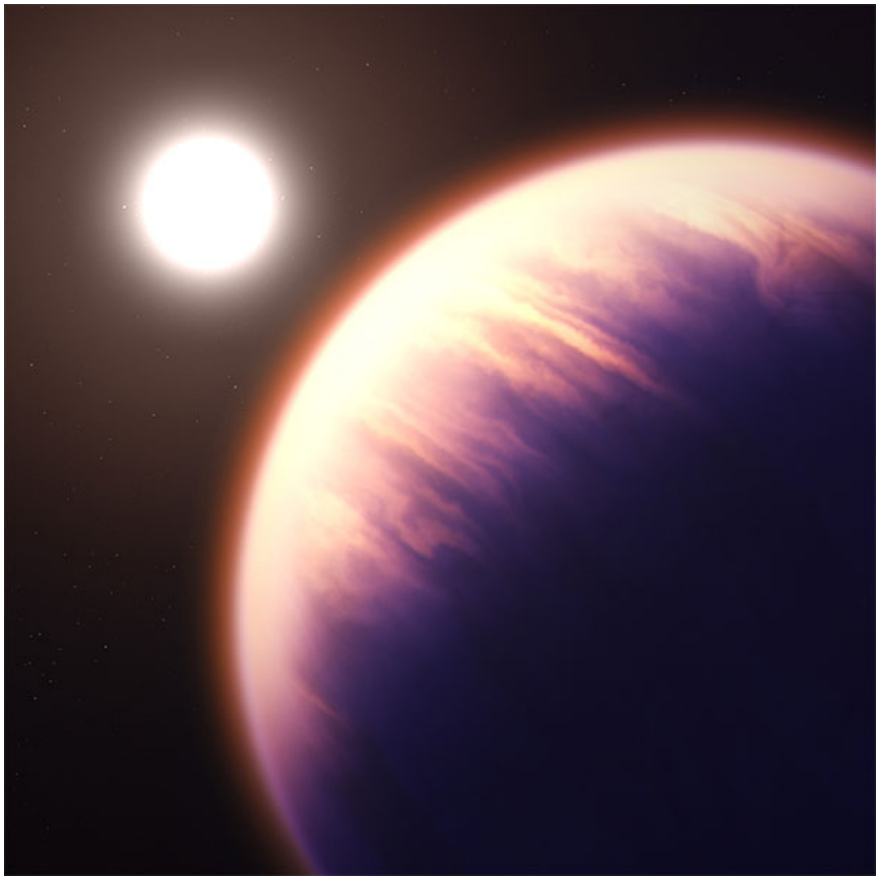
This exoplanet is half day and is nearly 800 degrees Celsius hot

One of the groundbreaking capabilities of the James Webb Space Telescope is its ability to not only detect very distant planets, but also allow scientists to observe their atmospheres.

Recently, in a new study with help from James Webb, scientists discovered interestingly different conditions between morning and evening on a distant exoplanet. And this is also the first time such differences have been observed on a planet outside our solar system.

This is a gas giant called WASP-39 b, located about 700 light-years from Earth that James Webb has previously studied to learn about its atmosphere. This planet orbits very close to the host star, completing an orbit in just four days, so it is extremely hot. It is also tidally locked, meaning one side is always facing the star and the other side is always facing out into space, so there are huge differences in climatic conditions in each half of the planet.

Two years ago, James Webb also attracted attention when he took the first photo of WASP-39 b, and discovered the existence of many different impurities in the planet's atmosphere. Spectroscopic analysis revealed the presence of sodium, potassium, water, carbon dioxide, carbon monoxide and sulfur dioxide in the atmosphere of WASP-39 b. This is also the first time photochemistry has been observed on an exoplanet.



Back to the new research. This time, scientists focused on examining the boundary between the side facing the star, called day - eternal morning, and the other side, called night - eternal evening. The boundary between the two halves of the planet is the end zone, divided into two semicircles representing morning and evening conditions.

' *This is the first time that separate measurements of the direct evening and morning spectra of an exoplanet have been possible* ,' researcher Maria Steinrück from the University of Chicago said in a statement. ' *This method could be of great help in understanding the climate of exoplanets* '.

The data shows the evening half is much hotter, at 1,450 degrees F (800 degrees C), while the morning side is slightly cooler at 1,150 degrees F (600 degrees C). This may be due to the presence of clouds that can trap heat inside, combined with strong winds of up to thousands of miles per hour that carry hot air from day to night.

These measurements were only possible thanks to James Webb's extremely high sensitivity, which uses the NIRSpec (Near Infrared Spectrometer) instrument to detect minute changes in the light emitted by the host star, when it is filtered through the planet's atmosphere.

Essentially, understanding an exoplanet's atmosphere is important, not only to understand what the planet is like today, but also to understand how it formed in the past. Preliminary analysis suggests that WASP-39b was likely formed by a series of mergers with smaller bodies, and that its formation initially occurred relatively far from its central star.