# Deep blue planet

Since astronomers first discovered giant planets located incredibly close to their host stars, artists and scientists alike have tried to imagine what such 'hot Jupiters' might look like if they could be seen by human eyes. Thanks to the Hubble Space telescope, we now know the colour of one such world. HD 189733b, a planet located 63 light years away, is a deep cobalt blue, a darker blue than Earth's oceans.

HD 189733b is a transiting exoplanet, meaning that it crosses in front of — and, importantly for this study, behind — its host star as seen from the perspective of Earth. Astronomers typically study the atmospheres of hot Jupiters by analysing the spectra of starlight that has passed through the atmospheres as the planets pass in front of their stars. Carbon dioxide, water and organic molecules were previously detected in HD 189733b's atmosphere using this method.

This time, scientists used the Hubble Space Telescope Imaging Spectrograph to measure HD 189733b and its host star just before, during and just after the planet passed behind the star (*Astrophys. J.* **772,** L16; 2013). Before the planet vanished behind

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the star, some starlight reflected off it and then to Earth, but some was absorbed by the atmosphere, colouring the reflected light. When the planet moved behind the star, its contribution to the colour of the star–planet pair was removed.

What the scientists discovered was a surprise. The Hubble Space Telescope Imaging Spectrograph saw a drop in the amount of blue light — by one part in 10,000 — coming from the system as HD 189733b passed behind the star. The planet was blue.

Because it is very nearby and large (14% bigger than Jupiter), and has a very short orbital period of only 2.2 days, HD 189733b is one of the best-studied extrasolar planets and has been the subject of dozens of publications since its discovery in 2005. We know that its atmosphere is heated to 1,000 °C, and the contrast in temperature between its dayside and nightside generates howling winds of 7,000 km $hr^{-1}$. Powerful flares from its active host star drive variable plumes of hydrogen-rich gas off its atmosphere.

What is causing the blue colour of this stormy planet? Something in the air must be absorbing light at red wavelengths; a silicate-like titanium oxide is one possibility, fueling speculation that it could be raining molten glass in HD 189733b's atmosphere. ❐

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## The journalist's take

The blue planet has been a popular story, receiving wide coverage in mainstream media. Journalists have clearly enjoyed luring readers with the bait of HD 189733b's similarity in colour to Earth, then surprising them with the planet's hot temperatures and particularly its suggested molten-silicate rain.

Both NASA's headline and many news headlines derived from it were slightly misleading. The NASA release, titled "NASA's Hubble finds a true blue planet," implied that Hubble had discovered the planet itself. But Hubble did not discover HD 189733b; the latest discovery was merely of its colour. Furthermore, the speculation that molten-glass rain could explain the blue colour was based on previously published results from the Spitzer Space Telescope (*Astrophys. J.* http://dx.doi.org/10.1086/513741; 2007), not Hubble. But many news reports conflated the discovery of the blue colour and the molten-glass rain, incorrectly reporting them both as results of the Hubble study.

HD 189733b has actually been the subject of at least eight press releases from NASA alone (three in 2007, two in 2008, one in 2012 and two in 2013). From the wide press coverage after each one, it seems likely that many journalists did not realise they had heard about — and maybe even written about — this planet before. Perhaps this is because HD 189733b is not a particularly memorable name. Exoplanets are named after their stellar systems, in this case HD 189733; the stellar system name comes from the Henry Draper Catalogue of stars, which has classified 359,083 stars according to their spectroscopic characteristics.

There is not currently an established naming process to give popular names to exoplanets, but momentum has been building towards the development of one. In 2009, the International Astronomical Union, which approves the official names of all planetary bodies, recommended against issuing popular names to exoplanets because discoveries are often tentative.

However, a contest conducted by an American non-profit organization, Uwingu, invited members of the public to suggest names for exoplanets, and vote on suggestions — but required payment for participation (money so raised was earmarked for grants and education programs). Although the winning names weren't formally recognized, the International Astronomical Union took note of the contest's popularity and, in 2013, decided to restart discussion on operating an exoplanet naming process.

Naming the exoplanets would certainly help public education about them, and I have found many astronomers open to the idea of popular names. The question is: how are they to be named? Some scientists are interested in the public being involved in the naming process. Some are irritated with the International Astronomical Union's slow pace to establish a naming system, and a few question the Union's authority, asking whether they should be involved at all. But I have encountered nearly universal rejection of the notion that any money should be involved in the process.