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<p>Video Podcast Episode 12: Murk on a monster planet</p> <p>EMBARGOED UNTIL 10:00 (CET)/04:00 AM EST 11 December, 2007</p>		
<p>00:00 [Visual starts]</p> <p>[Narrator] 00:02 Using the NASA/ESA Hubble Space Telescope, astronomers have found the first clear evidence of high altitude haze or clouds in the atmosphere of an extrasolar planet. This discovery reveals a deeper understanding of the class of giant planets that astronomers call 'hot Jupiters'.</p> <p>00:23</p> <p>00:41 [Woman] This is the Hubblecast!</p> <p>News and Images from the NASA/ESA Hubble Space Telescope.</p> <p>Travelling through time and space with our host Doctor J a.k.a. Dr. Joe Liske.</p> <p>00:52 [Dr. J] Hello and welcome to the Hubblecast. Over the last 15 years astronomers have discovered more than 270 planets around other stars. A burning question is naturally: What are these so called extrasolar planets like? Well, most of them are actually giant gaseous worlds several times the size of Jupiter which is our own Solar System's largest planet. Others are smaller rocky or icy worlds that are still several times larger than our own home planet Earth. We have yet to discover a world that is similar to our own planet.</p>		<p>Artist's impression of hazy exoplanet.</p> <p>Image explosion</p> <p>Hubblecast Logo + web site</p> <p>Presented by ESA and NASA</p> <p>TITLE Slide: Episode 12: Murk on a monster planet</p> <p>Nametag</p> <p>Virtual studio: Dr J on camera</p> <p>Graphics of exoplanets behind Dr J</p>

01:30

[Narrator]

Using the Advanced Camera for Surveys (or ACS), the Hubble Space Telescope has recently observed a fascinating large gaseous planet around the star HD 189733. Careful analysis of these very high precision observations by a team lead by Frédéric Pont from the Geneva University Observatory showed that this planet, designated HD 189733b, possesses a murky haze layer extending over an altitude range of about 1000 km in the planet's upper atmosphere.

The atmosphere of this gaseous planet is at around 800 degrees Centigrade. This is due to its proximity to its parent star and is the reason that astronomers call this type of planet a 'hot Jupiter'.

These hazes are probably made of tiny condensed particles less than 1/1000th of a millimetre across, similar to those already known on Venus and Saturn's moon, Titan. Their presence means that the sky over HD 189733b would look very much like a red hazy sunset viewed from an industrially polluted city on Earth.

02:44

[Dr. J]

Today we have a special guest. This is Dr Bob Fosbury- he's the leader of the European Hubble effort. So tell me Bob what's so special about this particular star and its planet?

02:55

[Bob Fosbury]

Well this is a rather special planetary system because the star itself is quite small, it's only about 75% the size of our Sun and yet the planet itself is larger than Jupiter. So when the planet transits in front of the star it obscures quite a large fraction of light from the star which enables a very accurate measurement.

03:14

[Dr. J]

So what exactly made these observations so precise? Why was this only possible now?

03:20

[Bob Fosbury]

Well we have to do this from space because when we try and do this from the ground the atmosphere makes it very difficult to make precise measurements of brightness, so we do it from space. And the special thing about this particular observation is that the scientists spread the light out over many pixels in the detector. So rather than just having a little point of light representing the star on the detector the starlight was spread out into a spectrum using this so called 'grism mode' of the Advanced Camera for Surveys. Now, that enables a very precise measurement because you can measure over many many pixels (a large area of detector) but it also, by spreading out the colours, enables you to measure the brightness (or the reduction in brightness) of the starlight over many colours. So having these different measurements in different colours enables you to characterize the nature of the atmosphere.

Image of Hubble then rapid zooming along Hubble's axis towards the planet system past M27, the Dumbbell Nebula towards HD 189733

Hot planet

Hazy sunset over city.

Dr J and BF on camera.

Extrasolar planet images behind.

Grism images behind.

04:14

[Dr. J]

To detect the hazes astronomers actually had to do quite a bit of detective work.

The reason why this work was possible at all was because from our vantage point the orbit of HD 189733b is seen almost exactly edge on. Now what that means is that every two days or so the planet actually moves across the face of its parent star as seen from here. Now when that happens some small fraction of the light from the star has to pass through the atmosphere of the planet in front of it in order to reach Earth. Because of this process the composition of the atmosphere of the planet is stamped onto the light like a unique fingerprint. Astronomers can then see this fingerprint in the spectrum of the star's light.

05:04

[Narrator]

The astronomers were expecting to see clear signatures of sodium, potassium and water in the planet's atmosphere. The fact that these were not seen led them to this conclusion that they were being masked by red-coloured high clouds or haze.

According to the scientists the haze probably consists of tiny particles (less than 1/1000 mm in size) of condensates of iron and silicates.

05:30

[Dr. J]

When extrasolar planets were first discovered about 15 years ago, little did we know how quickly we would begin to reveal their secrets. These new Hubble observations are an important new step towards our understanding of these amazing planets outside our Solar System. Who knows what we will detect in the next few years about these distant worlds?

This is Dr. J signing off for the Hubblecast.

Once again nature has surprised us beyond our wildest imagination ...

05:58

[Outro]

Hubblecast is produced by ESA/Hubble at the European Southern Observatory in Germany. The Hubble mission is a project of international cooperation between NASA and the European Space Agency.

06:15

END

Dr J inside giant virtual orrery.

[Cut to close up of 'orrery']

Graphics illustrate how the planet is aligned so that the atmosphere can be studied when the planet is in eclipse.

Graphic of gas giant planet orbiting star.

Zoom on red sunset around the rim of the planet and show minute particles

Virtual studio: Dr J on camera