




<p>Hubblecast Episode 36: Anniversary EMBARGOED UNTIL 10:00 (CEST)/04:00 am EDT 23 Apr, 2010</p>		
<p>00:00 [Visuals start]</p> <p>00:01 [Narrator 1] Imagine that we could really have a time machine that would show us what happened in the early Universe. A machine that would become more powerful and give us progressively clearer pictures, even as it aged. Imagine that the machine could detect worlds beyond our Solar System, help map invisible dark matter and characterise the expansion of the Universe. It may come as a surprise, but this time machine does exist and is silently floating above us. Familiar enough to many to be taken for granted, the NASA/ESA Hubble Space Telescope celebrates two astonishing decades in orbit on the 24th of April.</p> <p>00:57 [Woman] This is the Hubblecast! News and images from the NASA/ESA Hubble Space Telescope.</p> <p>01:11 [Dr. J] Wow, this thing travels over over 28,000 kilometres per hour...930,000 observations and snapped over 570,000 images of 30,000 celestial objects...twenty years, two decades and 110,000 trips around our planet...</p> <p>01:44 [Production assistant] Dr. J, 30 second to showtime!</p> <p>01:46 [Dr. J] Ok.</p> <p>02:11 [Dr. J] After two decades of service to the scientific community and the public worldwide, tonight we are recognising the achievements of what is, arguably, the most renowned and</p>		 <p>Standard Hubblecast Sequence</p>  

beloved space observatory in history. Welcome to the show! Maybe you know it for its awe-inspiring images or, maybe you know it for its fundamental science discoveries, but, the chances are, you do know it. Tonight we honour the Hubble Space Telescope with the Cosmic Lifetime Achievement Award.

02:42

[Narrator]

It is not just about pretty pictures, even though Hubble is famous for some of the most intriguing and coincidentally artistic images in the Universe. Astronomers — professional and amateur alike — have been translating the magnificent colours and poetic swirls of these images into hard-edged science. Twenty years of observations have produced more than 45 terabytes of data, enough information to fill nearly 5800 DVDs. Each month the orbiting observatory generates more than 360 gigabytes of data, which could fill the storage space of an average home computer.

03:24

[Dr. J]

It is a real honour to be able to celebrate my dear friend Hubble. Tonight we pay tribute to your venerable achievements and we look forward to the work that lies ahead of you. We will look at some of your most accomplishments and your most loved images from the past twenty years. One of your most recent achievements takes us back to the early days of the Universe.

03:47

[Narrator 3]

Scientists and space enthusiasts worldwide were wowed by the deepest pictures of our Universe captured by Hubble. The first Hubble Deep Field was taken in 1995 and opened a whole new field of research. Hubble has since repeated the success and the latest Hubble Ultra Deep Field image lets us see back in time 13 billion years — just 600 million to 800 million years after the Big Bang! This was one of the first and most spectacular datasets taken with Hubble's brand-new Wide Field Camera 3. By studying galaxies at different epochs, astronomers can see how galaxies change over time.

04:28

[Dr. J]

A staple of science fiction movies for decades, black holes are among the Universe's most elusive and intriguing enigmas. Their existence was confirmed by Hubble in 1994 when Hubble's high resolution made it possible to see the effects of a black hole's gravitational attraction on its surroundings.

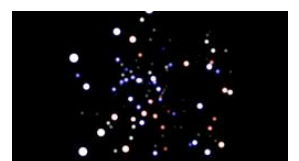
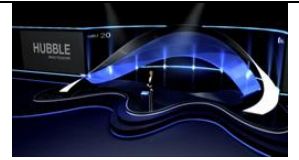
04:48

[Narrator]

Hubble has also proved that black holes are most likely present at the centres of all galaxies. After this discovery, the orbiting observatory then began further examination of the relationship between supermassive black holes and their home galaxies and found that a galaxy's bulge and the mass of its black hole are closely interconnected.

05:11

[Dr. J]



Hubble could also be honoured with a congeniality award for getting to know our neighbours in the Solar System. Hubble has imaged most of the planets and has the advantage of being able to carry out long-term studies from its vantage point 600 kilometres above the Earth.

05:29

[Dr. J]

Have you ever been lucky enough to see the enchanting northern or southern lights? Well, Hubble has captured the alluring aurorae that light up the poles of the gas giants, Jupiter and Saturn, and it has caught glimpses of comet impacts on Jupiter. Aside from the planets, Hubble has also studied asteroids like the 500-kilometre sized Vesta. The resulting map of its surface shows a strange world with a gigantic impact crater and, possibly, even ancient lava flows.

06:01

[Narrator]

But what is happening beyond our immediate cosmic neighbourhood? This is a topic that fascinates many of us and Hubble has not only helped to detect worlds outside the confines of the Solar System, but it can also help to characterise them.

06:19

[Dr. J]

In November 2001, Hubble made the first direct detection of the atmosphere of a planet orbiting another star. In this case, it was the Sun-like star called HD 209458, located 150 light-years away in the constellation of Pegasus. Knowing the makeup of a planet's atmosphere allows scientists to determine whether "life as we know it" could conceivably exist on the "alien world".

In 2008, Hubble made the first visible-light image of an extrasolar planet ~~circling the nearby~~, it's in orbit around bright southern star Fomalhaut, located 25 light-years away in the constellation of Piscis Australis. The star is surrounded by An immense debris disc over 35 billion kilometres across surrounds the star. The planet is orbiting almost 3 billion kilometres inside the disc's sharp inner edge, or about 10 times the distance of Saturn from the Sun.

07:18

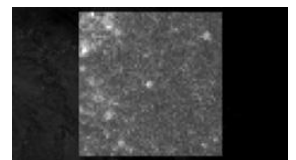
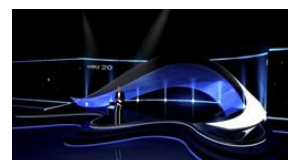
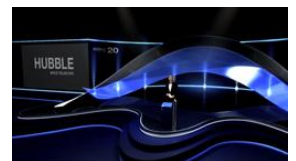
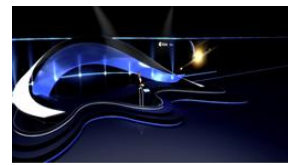
[Narrator]

By measuring bright stars that vary predictably, known as Cepheids, Hubble has been able to use these stars as distance markers, laying a firm foundation for subsequent measurements that led to the discovery of the accelerating Universe and a more precise determination its age.

07:37

[Dr. J]

Astronomers have used Hubble to observe Cepheids and to pin down their distances more accurately. These results were used as a stepping-stone to measure the distances to supernovae, which, in turn, told us about the scale of the Universe. As a result, today we know the age of the Universe with much more precision than before Hubble: it is about 13.7 billion years.



In the 1920s, Hubble's namesake, the astronomer Edwin Hubble, discovered that the Universe was expanding. The observatory that bears his name helped to determine the rate of this expansion and to show that, in fact, this expansion was accelerating. This was the smoking gun that has pointed to the existence of the elusive dark energy.

08:24

[Narrator]

When we look up at the night sky, it is easy to believe that space is just a giant void with some twinkling stars and a few recognisable planets. However, we must remember that there are structures and matter that we cannot see. Hubble is helping to define, in three dimensions, the distribution of ghostly and invisible dark matter in the Universe.

[Dr. J]

08:48

Studies completed in 2007 and just earlier this year have given astronomers a clearer idea of the structures that lie between galaxies. These structures do not contain any stars and they are made up of mostly dark matter, which makes them somewhat difficult to identify. By analysing the COSMOS survey — the largest ever survey undertaken with Hubble — international teams of astronomers announced one of the most important results in cosmology: a three-dimensional map that offers a first look at the web-like large-scale distribution of dark matter in the Universe. The historic achievement accurately confirmed standard theories of structure formation.

09:29

[Narrator 8]

Hubble has allowed for many comprehensive studies of the life and death of stars — the way stars develop, live their lives and, eventually die. Closely following the timeline of stars, we get a better idea of what is happening in our own galaxy and others.

[Dr. J 9]

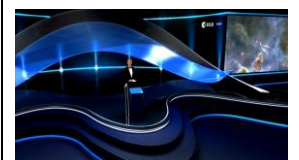
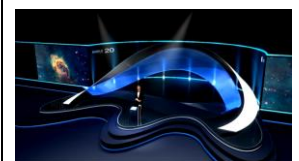
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Sensitive infrared instruments onboard Hubble allow us to see through clouds and columns of interstellar dust to witness the birth of stars. Many Hubble images feature blue, hot stars at the early stages of their lives. At the other end of the stellar lifetime, Hubble lets us see remote supernovae and gamma ray bursts — the final, dramatic explosions that signal the end of a star's life.

10:18

[Dr. J 10]

And now, I am proud to present Hubble's 20th anniversary image. Hubble captured the chaotic activity atop a three-light-year-tall pillar of gas and dust in the Carina Nebula, located about 7500 light-years away in the southern constellation of Carina. The pillar is being eaten away by the brilliant light from nearby stars and it is also assaulted from within, as infant stars buried inside fire off jets that can be seen streaming from the towering peaks.



10:55

[Dr. J 11]

Nestled inside this dense mountain are fledgling stars. Long streamers of gas can be seen shooting in opposite directions from the pedestal at the top of the image. Another pair of jets is visible at another peak at the centre of the image. These jets are an indicator for the birth of new stars. A jet like this is launched by a swirling disc around a star, and it is this disc that allows material to slowly accrete onto the surface of the star.

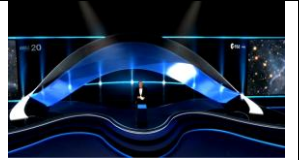
11:25

[Dr. J 12]

What a fantastic image and what a great way to celebrate this amazing observatory's capabilities. Thanks for twenty incredible years, Hubble, and here's to many more! This is Dr. J signing off for the Hubblecast and wishing Hubble, and all those who admire it, a happy 20th anniversary!

11:45

END



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.

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