









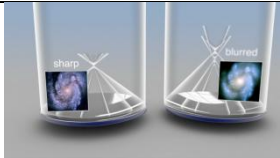




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<p>Hubblecast Episode 41: Hubble's History Told by Hubble's Scientists</p> <p>FOR IMMEDIATE RELEASE 14 December, 2010</p>		
<p>00:00 [Narrator] How do you get from here...</p> <p>to here...</p> <p>to here?</p>		
		
<p>00:42 [Narrator] Venice is just a few centimetres above sea level, about as far from space as you can get.</p> <p>But in 1609, Galileo Galilei brought this city a bit closer to the stars when he gave one of the very first demonstrations of his telescope.</p> <p>A few months after that, he discovered Jupiter's moons, Io, Ganymede, Callisto and Europa.</p> <p>Four centuries later, another telescope is making history here, as scientists gather to discuss the latest results from Hubble.</p>		

<p>01:16 [Narrator] Hubble was launched in 1990. And that's of course when its history of scientific discoveries starts.</p> <p>But Hubble's history isn't just about science and technology.</p> <p>Like Galileo's story, it's also one of politics, money... and extremely smart people doing very difficult things.</p>	
<p>01:39 [Bob O'Dell]</p> <p>I became the first project scientist for the observatory in 1972.</p> <p>And as such I was the scientific leader for this observatory throughout its design and much of its construction.</p> <p>Difficult decisions were the normal thing in the early days. Because in the early days we were often dead as a programme, and then we would be revived.</p> <p>Probably in the most difficult decisions were the simplifications that we had to make. For example, originally the design was for a 3-metre aperture observatory. But in order to save money, we had to reduce it to its final size of 2.4 metres.</p>	
<p>02:40 [Narrator]</p> <p>While the Hubble team hacked away at the technical problems and struggled to stay on budget, a political storm was brewing in Washington DC.</p> <p>Politicians were alarmed by the rising costs, and told NASA to find an international partner.</p>	
<p>03:00 [David Leckrone]</p> <p>So early collaboration with Europe was absolutely critical for the Hubble Space Telescope even to be started. There was a lot of controversy within the United States Congress about whether this programme should be funded or not. And it was a huge boost to the support of the programme in our own Congress because there was a sense that there would also be collaboration and support from outside and in particular from Europe.</p>	

<p>03:27 [Duccio Macchetto] At a different level, we saved the project. I mean, the fact that ESA was a partner of NASA saved the project a number of times before launch, and I believe that we also helped a lot after launch, when the spherical aberration was discovered. The fact it was an international project meant it was much harder for the politicians in the US who wanted to kill the Hubble Space Telescope to do so.</p>	
<p>03:54 [Narrator] Hubble survived the politics, only to be derailed by optics. Spherical aberration – a flaw in the main mirror – meant that the telescope couldn't focus properly. Where Hubble's images should have been razor-sharp, astronomers instead struggled to make out the fine details of their observations.</p>	
<p>04:14 [Sandy Faber] I look back on the days when we diagnosed the spherical aberration as simultaneously the most exhilarating and depressing days of my scientific career.</p> <p>Because, for the better part of two weeks, we were puzzled as to why this telescope wasn't performing and it became a scientific problem that scientists had to solve.</p> <p>But in a great irony in the process of solving it and finding out what was wrong we also unearthed this enormous, monumental disaster.</p>	
<p>04:49 [Narrator] Though nobody had predicted a problem with the mirror, Hubble was designed with the unexpected in mind.</p> <p>It's the only space telescope ever launched that was meant to be serviced in space. This meant astronauts were able to return to Hubble to fix the problem.</p> <p>They've been back another four times to carry out repairs and install upgrades.</p>	

05:12

[John Grunsfeld]

As an astronaut the Hubble Space Telescope mission is kind of the holy grail of being able to go up and do something that is widely regarded as extremely important.

When we send a crew and when I go up to the Hubble Space Telescope, with the teams that I've led, there's always been rule number one: rule number one is don't break the telescope. You know, we're in big bulky space suits and after all it's a delicate scientific instrument.

So when the first images come down, you know, it's beautiful.

To see some star that is in the act of exploding, or a beautiful galaxy interacting with another galaxy.

And the science is very deep and meaningful. But to those of us who have been up there working on the telescope, it means that we didn't break rule number one. That the telescope really works. And there's a tremendous amount of satisfaction in that.

I think the crowning achievement of all of our missions has been on this mission in 2009 where we did brain surgery on the STIS instrument and on the Advanced Camera for Surveys. Removing tiny screws and pulling circuit boards. This was technically the hardest but I think also the most rewarding.



06:28

[Narrator]

Risky, difficult and exciting in space, these Hubble repair missions are nail-bitingly tense for the team here on Earth too.



06:37

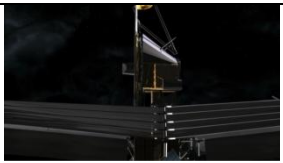


[Linda Smith]

It was nerve-wracking, I've never experienced anything like that. We were there as a team, waiting for John Grunsfeld to open up the camera and to repair it, and everything rested on a successful repair.

And it was just wonderful when we did the aliveness test and saw that the repair had been successful. And then we did the functional test, which was done a few hours afterwards, when we got the first set of data coming and it looked... it was better than it had been before because of the updated electronics.

So it was extremely satisfying and exhilarating.



<p>07:16 [Narrator] And so from planning, to launch, to repair, Hubble's history has been a rollercoaster of highs and lows.</p> <p>With the telescope recently serviced, Hubble has more years in it still.</p> <p>And scientists are already preparing what comes next.</p>	
<p>07:42 [John Mather]</p> <p>We've learned a few lessons from Hubble. One is that wonderful equipment will make wonderful discoveries.</p> <p>The James Webb Telescope is aimed to go beyond what Hubble does by looking at things that are further away, or fainter, or redder than Hubble can see, so that we can look further back towards the beginning of time: we can see inside dust clouds where stars are being born today; we can study planetary systems as they're being made and as they change with time.</p> <p>Scientifically we learned that Hubble is wonderful, but not quite wonderful enough. There's stuff just beyond what the Hubble can see that we really want to be able to pursue.</p>	
<p>08:21 [Narrator] The first galaxies.</p> <p>The first stars.</p> <p>The formation of stars.</p> <p>The evolution of planetary systems and the hunt for exoplanets' atmospheres.</p> <p>These are some of the things we can look forward to seeing in the years to come.</p>	
	<p>Interviews conducted at the Science with the Hubble Space Telescope III conference in Venice, Italy, in October 2010.</p>

	<p>Hubblecast is produced by ESA/Hubble at the European Southern Observatory in Germany.</p> <p>The Hubble mission is a project of international cooperation between NASA and the European Space Agency.</p> <p>Credits</p> <p>SOCIAL MEDIA AD</p> <p>ESOcast AD</p>
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