



An image of the Butterfly Nebula captured by the Hubble Space Telescope.

Q&A: Marek Kukula

Star-map historian

Marek Kukula is public astronomer at London's Royal Observatory in Greenwich and the curator of *Visions of the Universe*, an exhibition charting the trajectory of celestial imaging, with a focus on astrophotography. On the eve of its opening, Kukula talks about eighteenth-century star maps and the co-evolution of the telescope and camera.



How did you get into astronomy?

I decided I wanted to be an astronomer during a family trip to Jodrell Bank in Cheshire, UK, when I was in my teens. I remember looking up at the giant radio telescope and learning about how scientists were using it to try to answer some of the biggest questions in the Universe. It seemed like a huge intellectual adventure.

What links the Royal Observatory to the exhibition's venue, the National Maritime Museum?

The observatory was built to make very accurate maps of the stars for use in navigation, which is why astronomy had government funding in the seventeenth and eighteenth centuries. It was really only in the nineteenth century that people began to use observatories for modern astronomy and astrophysics.

What is the idea behind *Visions of the Universe*?

The focus is astrophotography and its evolution, told through roughly 100 iconic images of space, primarily from the past 150 years [though there are also some sketches from the pre-photography era]. The role of the telescope in astronomy is familiar, but a parallel story has been less well told: the impact of the invention and development of the camera on this field. We wanted to reveal how the telescope and the camera have changed the way we see the Universe, a story astronomers can be very proud of. Although the earliest cameras were not really suitable because they needed quite a lot of light, astronomers were among the first people to recognize their potential, and helped to develop the technology to a point at which it was actually useful.

How did you choose the images?

It has been a really agonizing process trying to narrow them down. We tried to pick ones that tell a good story, and included some because they just look so beautiful. Some are hugely important in scientific terms, if not in aesthetic ones. The first image beamed back

Visions of the Universe
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in 1959 by one of the Soviet lunar probes as it went behind the Moon is a really grainy television picture. When we dragged it up on the Internet, we burst out laughing because it is such a rubbish image. But it is hugely significant, both scientifically and culturally. It was the first time anyone had seen the other side of the Moon.

Other images combine artistry with science. There is a really famous one from the Cassini space probe of Saturn eclipsing the Sun. There's a technology story here: this is of course a view that's impossible from Earth. Because we can send a camera on a spacecraft out to Saturn, we're able to see this really stunning view. Between the inner and outer rings is a tiny speck, which is Earth. We're in the picture as well.

Which are your favourite images?

One is of the Andromeda Galaxy taken by Edwin Hubble on 19 October 1923. At the time, there was a great debate about whether the Milky Way was the entire Universe. Hubble picked out one star that is variable in brightness, so he wrote 'VAR!' on the photographic negative. The key thing about variable stars is that if you can measure their variability, you can calculate their distance. When he worked this out, he discovered that the Andromeda Nebula is 2.5 million light years away, well beyond the Milky Way. This image revealed the Universe as hundreds of times bigger than we had assumed.

What's the thinking behind the pictures from the surface of Mars?

I find those images incredibly moving. On one level they look ordinary and boring: there's a desert; there are some rocks. But they're on another planet — that's incredible! For thousands of years, people saw Mars as a red dot in the sky. About 400 years ago, they started to see it as a tiny disc and began to see landscape features. We are the first generation in history to see it as a landscape, with pebbles and sand dunes and hills, and to drive our robot avatar through it.

What do you enjoy most about being public astronomer at the Royal Observatory?

I get to work alongside historians of science. At university you tend to see science as a linear progression, but the observatory's curators remind me that scientists in earlier centuries had no idea of the correct route to pursue. That gives you a much better understanding of why we do things in sometimes quite perverse ways in modern science: this is the legacy of how we've arrived at our modern understanding.

INTERVIEW BY DANIEL CRESSEY

NASA/ESA AND THE HUBBLE SM4 ERO TEAM

NICK HIGGINS