



FIND 15 GLORIOUS GLOBULAR CLUSTERS THIS MONTH

#208 SEPTEMBER 2022

Sky at Night

THE UK'S BEST SELLING ASTRONOMY MAGAZINE

DRAMATIC FIRST IMAGES

WONDERFUL WEBB

What JWST's stunning first photos really show **PLUS** its science journey explained

**SPECTACULAR PLANETS:
SEE 5 WORLDS IN ONE NIGHT**

**HOW TO ANIMATE JUPITER
AT ITS BRIGHTEST & BEST**

**HANDS FREE: A BINOCULAR
MOUNT FOR YOUR SUNBED**

**THE FIRST BLACK WOMAN
IN SPACE, 30 YEARS ON**

**NEW BEGINNER'S
SCOPE TESTED**

**PULL-OUT
SKY GUIDE**

Discover the best
observing with our
handy planner





NASA/ESA/CSA/STSCI

JWST LIGHTS UP THE UNIVERSE

In July, a momentous new era in space science began when NASA released the first full-colour images from the James Webb Space Telescope. We look at the first five that stunned the world

Captured in infrared light, this image of 'Cosmic Cliffs' within the Carina Nebula, 7,600 lightyears away, reveals structures and star-forming regions previously unseen by human eyes. It's a much-loved target for amateur astronomers and astrophotographers, but no one will ever have seen it like this.

This glowing 'wall' is the edge of a cavity within the nebula that features peaks of cosmic gas and dust seven lightyears high. It's being hollowed out by the intense

radiation emitted by newborn stars located just above the area shown in the image. The 'haze' that seems to be rising from the wall is ionised gas and hot dust streaming away from the nebula under relentless radiation pressure.

Webb's NIRC*am* instrument, which was used to capture this image, observes in infrared, enabling astronomers to peek through the dense cosmic dust and get a good look at what's really going on at the heart of this nebula. What we are seeing

are views of these stellar nurseries and pockets of young stars that until now were beyond humanity's reach.

Commenting on Webb's first images, NASA deputy administrator Pam Melroy said: "What I have seen moved me, as a scientist, as an engineer and as a human being." Having seen them now for ourselves, it's difficult not to agree with her.

**TURN THE PAGE FOR MORE OF
WEBB'S BRAND NEW IMAGES**



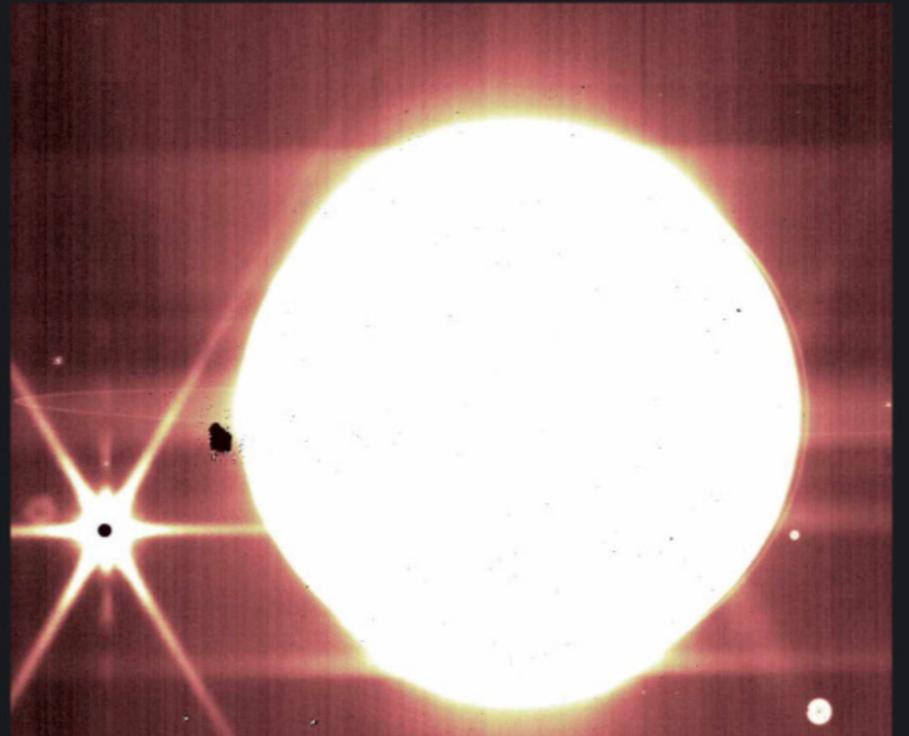
△ Field of dreams

This is the deepest infrared image of the distant Universe ever captured. Webb's First Deep Field is bursting with thousands of galaxies, but the focus is SMACS 0723, a galaxy cluster so far away it appears to us as it did 4.6 billion years ago. Its mass is so staggering that the light from background galaxies is magnified and contorted by gravitational lensing. This image alone is a treasure trove for scientists to unpack.



◁ Two glorious rings

Not one view of the Southern Ring Nebula, but two. This is a planetary nebula, a dying star shedding its layers into space, captured in both near-infrared (left), and mid-infrared (right) where we can actually see the remnant white dwarf core (the redder of the two).



△ Target practice

Captured during the testing phase that would refine Webb's incredible imaging powers, this image of Jupiter honed the telescope's instruments before science operations officially began on July 12. In it we can see the planet's distinctive rings, as well as its moons Europa, Thebe and Metis. We can also see a region of dead pixels on one of the camera's detectors, the black spot on the second image.



◁ Five for the price of one

Webb's largest image yet, Stephan's Quintet – a group of merging galaxies – covers an area one-fifth the size of the Moon. The telescope's near- and mid-infrared instruments combined to reveal never-before-seen features within the galaxies, as well as shockwaves caused by galaxy NGC 7318B smashing through the cluster.

**MORE
ONLINE**

Explore a gallery of these and more stunning space images

The latest astronomy and space news, written by Ezzy Pearson

BULLETIN

JWST unveils its first images

The incredible pictures took just one week of observing time to create

After decades of waiting, the James Webb Space Telescope (JWST) has released its first scientific images to the public.

“Today, we present humanity with a ground-breaking new view of the cosmos – a view the world has never seen before,” said NASA administrator Bill Nelson.

On 11 July, President Joe Biden was given an advance view of the images, and thanked “the team at NASA for once again showing who we are”.

The first deep-field image was released that evening. The next day, on 12 July, NASA released three more images, as well as a spectra of exoplanet WASP-96b’s atmosphere, which showed clear signs of water. Before long, the images were shared on news channels and social media the world over, as people marvelled at the unprecedented detail in the images

– all of which were taken within a single week of observing time.

“The Hubble Deep Field was two weeks of continuous work with Hubble. We did [ours] before breakfast,” says Jane Rigby, operational project scientist for JWST. “The amazing thing about Webb is the speed with which we can churn out discoveries.”

But while the images stunned the world, a report on JWST’s performance revealed an unexpectedly large micrometeorite strike in May has caused a “significant uncorrectable change” to one of the mirror segments. Fortunately it only affects a small area and JWST is still performing above expectations.

To see the first images turn to **page 6**, and learn more about the science that JWST is set to deliver on **page 28**.

webbtelescope.org



▲ President Biden reveals the first full-colour image – the deepest infrared picture of the Universe yet – to a waiting world

Comment

by Chris Lintott



I was wrong. Utterly, wonderfully wrong. For over a decade, I’ve flinched when space agency press releases described JWST as the successor to the Hubble Space Telescope. Though both are incredible tools for science, Hubble is best known for its spectacular images. JWST, though, is an infrared telescope; working with

wavelengths beyond what our eyes can see inevitably makes the view blurrier. Setting up JWST as a machine capable of producing images as beautiful as Hubble’s, no matter their scientific utility, was asking for disappointment.

Wrong, as I said. I have the JWST image of the Carina Nebula as my laptop background, and

Stephan’s Quintet on my phone. It turns out that a mirror six metres across is large – large enough to produce crystal-clear, pin-prick-sharp images to wow the world.

Welcome to the infrared Universe! Beautiful, isn’t it?

**Chris Lintott co-presents
*The Sky at Night***