

Thaxted Astronomical Society

News

Features

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Highest-ever Resolution

Images Of The Sun

<https://www.dailymail.co.uk/sciencetech/article-8203175/British-researchers-reveal-highest-resolution-images-Sun.html/>

## Highest-ever resolution images of the Sun reveal its atmosphere is much more complex than previously thought

Daily Mail 9<sup>th</sup> April 2020 >

- The images show that spots on the surface are filled with hot plasma strands
- They were captured by NASA's High-Resolution Coronal Imager telescope (Hi-C)
- Researchers say the images provide insight into the Sun's complex atmosphere

Newly released images of the Sun are the highest-resolution pictures of our star ever taken and they reveal its atmosphere is much more complex than first thought

Scientists from the University of Central Lancashire and NASA's Marshall Space Flight Center studied the images taken by the space-based NASA High-Resolution Coronal Imager telescope.

The pictures revealed that parts of the Sun's atmosphere, thought to be dark or mostly empty, are filled with strands of hot electrified gasses 311 miles wide.

Each of those strands are up to 1.8 million degrees Fahrenheit and are larger than the distance between London and Belfast, according to researchers.

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NASA's Hi-C telescope can pick out structures in the Sun's atmosphere as small as 43 miles in size - or about 0.01 per cent of the total size of the star.

It was able to capture the incredibly fine magnetic threads in the 'dark areas' and scientists say they are made of extremely hot, million-degree plasma.

What exactly created these strands remains unclear, according to the Lancashire research team, although it will now become a focus for astronomers.

The Hi-C, the telescope that captured the images, is a unique astronomical telescope carried into space on a sub-orbital rocket flight.

The telescope launches to the edge of space where it then captures images of the star every second before returning to Earth after five minutes.

The international team of researchers behind the discovery and the telescope are now working on plans to launch the Hi-C rocket mission again.

Next time overlapping their observations with two Sun-observing spacecraft currently gathering further data, NASA's Parker Solar Probe and ESA's Solar Orbiter.

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Dr Amy Winebarger, Hi-C principal investigator at NASA MSFC stated: 'These new Hi-C images give us a remarkable insight into the Sun's atmosphere.'

'Along with ongoing missions such as [Probe and SoLO](#), this fleet of space-based instruments in the near future will reveal the Sun's dynamic outer layer in a completely new light.'

Scientists will debate why they are formed and how their presence helps us understand the eruption of solar flares and solar storms.

Those are events from the Sun that could directly affect life on Earth.

Tom Williams, a postdoctoral researcher at UCLan who worked on the Hi-C data, said the images would help provide a greater understanding of how the Earth and Sun related to each other.

'This is a fascinating discovery that could better inform our understanding of the flow of energy through the layers of the Sun and eventually down to Earth itself.'

'This is so important if we are to model and predict the behaviour of our life-giving star', he added.

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Robert Walsh, professor of solar physics at UCLan, said the images provided an 'ultra-high definition' glimpse of the Sun for the first time.

'Until now, solar astronomers have effectively been viewing our closest star in 'standard definition', Walsh said.

'The exceptional quality of the data provided by the Hi-C telescope allows us to survey a patch of the Sun in 'ultra-high definition' for the first time.'

The images show the outer layer is filled with previously unseen fine magnetic threads of hot plasma - giving a deeper insight into the make up of the star.

'Think of it like this: if you are watching a football match on television in standard definition, the football pitch looks green and uniform,' said Walsh.

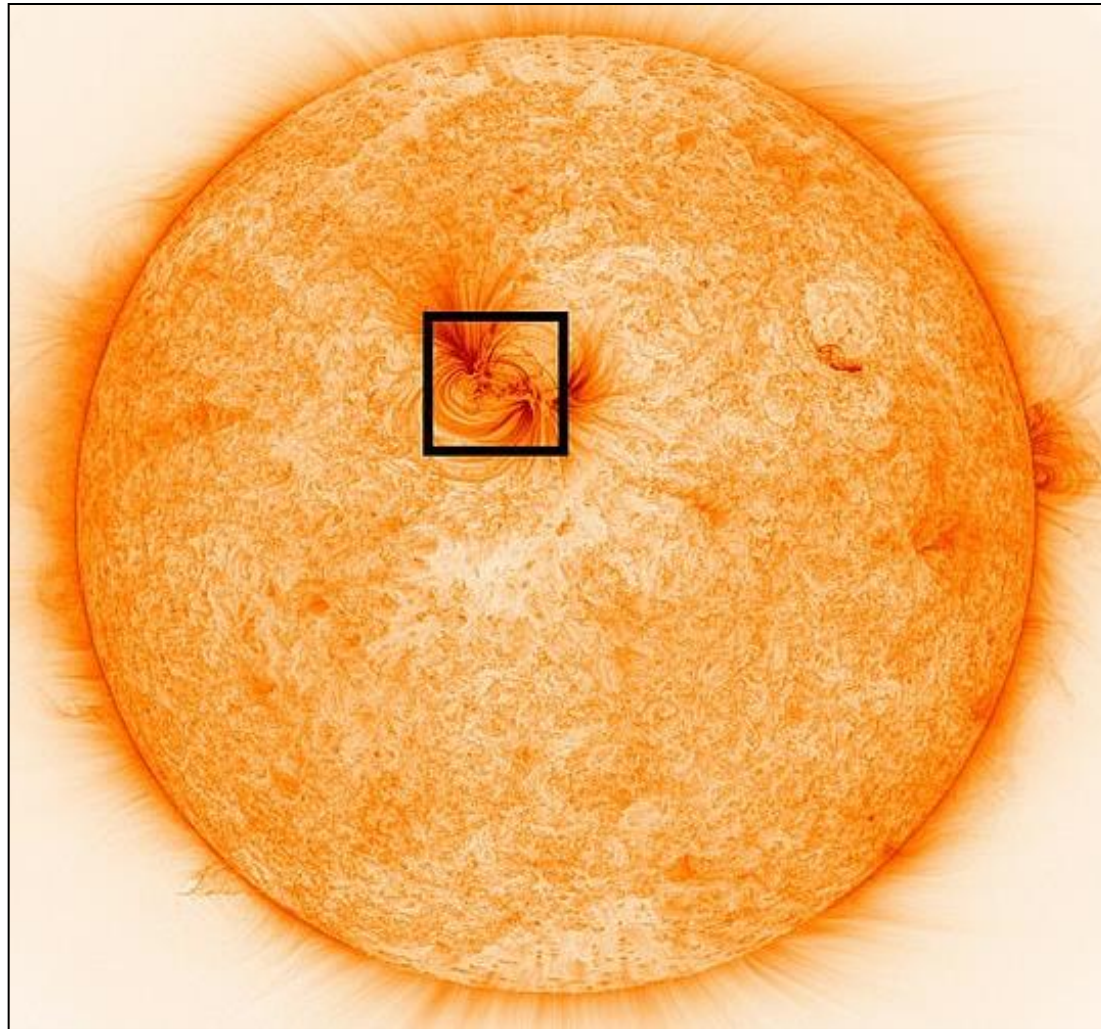
'Watch the same game in ultra-HD and the individual blades of grass can jump out at you – and that's what we're able to see with the Hi-C images. We are catching sight of the constituent parts that make up the atmosphere of the star.'

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British researchers have revealed the highest-ever resolution images of the Sun and its atmosphere, showing plumed of electrified hot gas in dark spots - highlighted in the square



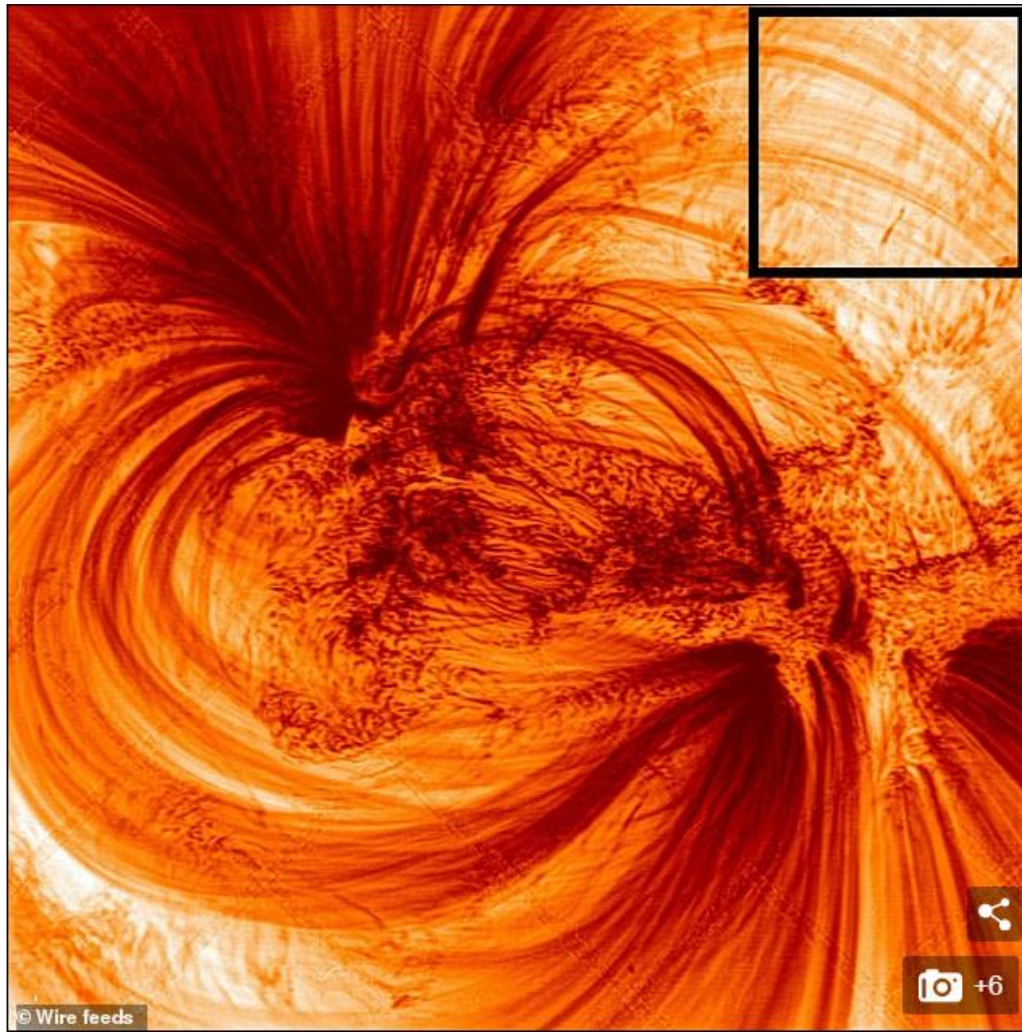


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The images revealed the Sun's atmosphere is made up of strands of electrical gas at extreme temperatures. The ultra-fine strands can be seen clearly in the box in the top right

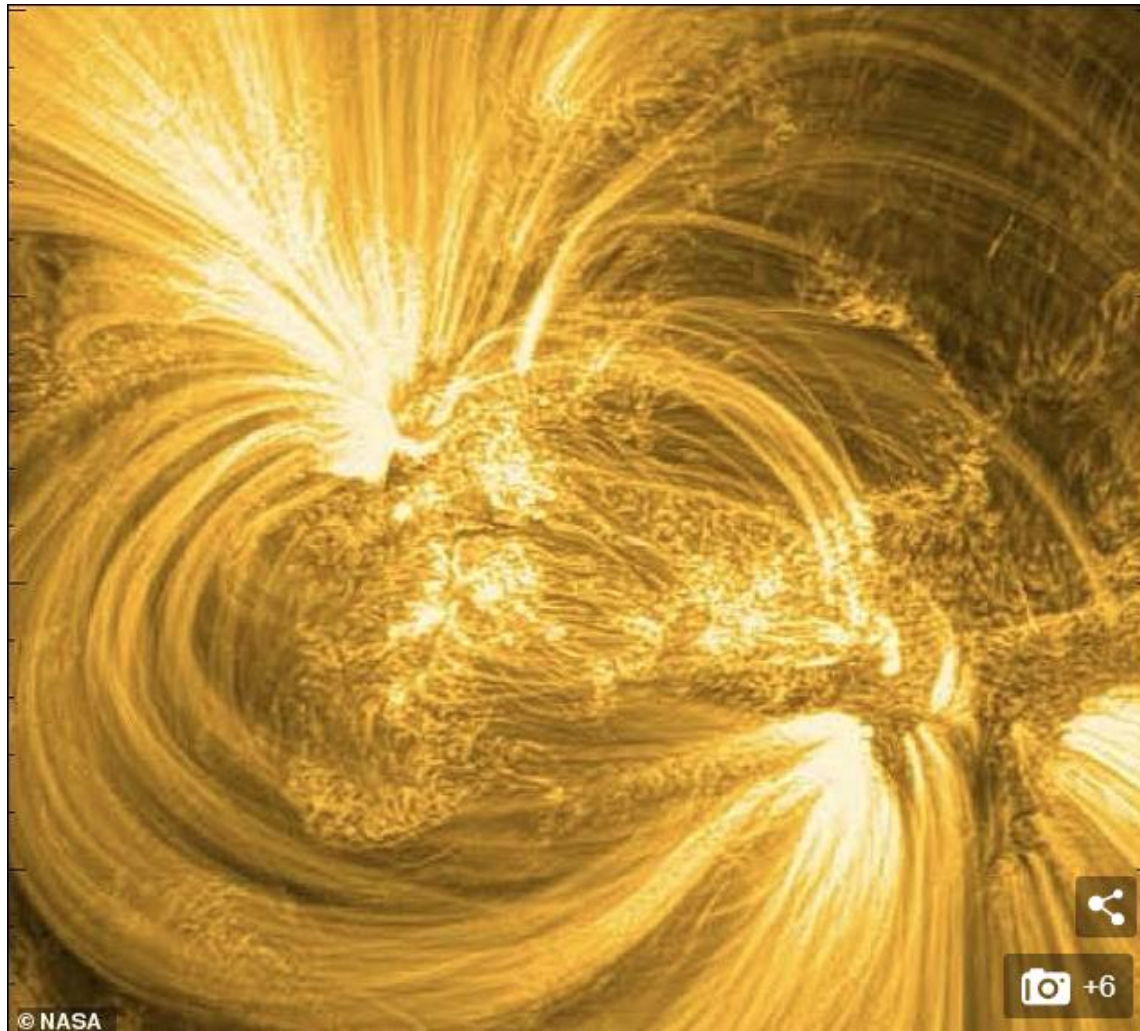


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While the strands look like human hairs, they are incredibly hot - reaching more than one million degrees celsius - and are each 311 miles wide



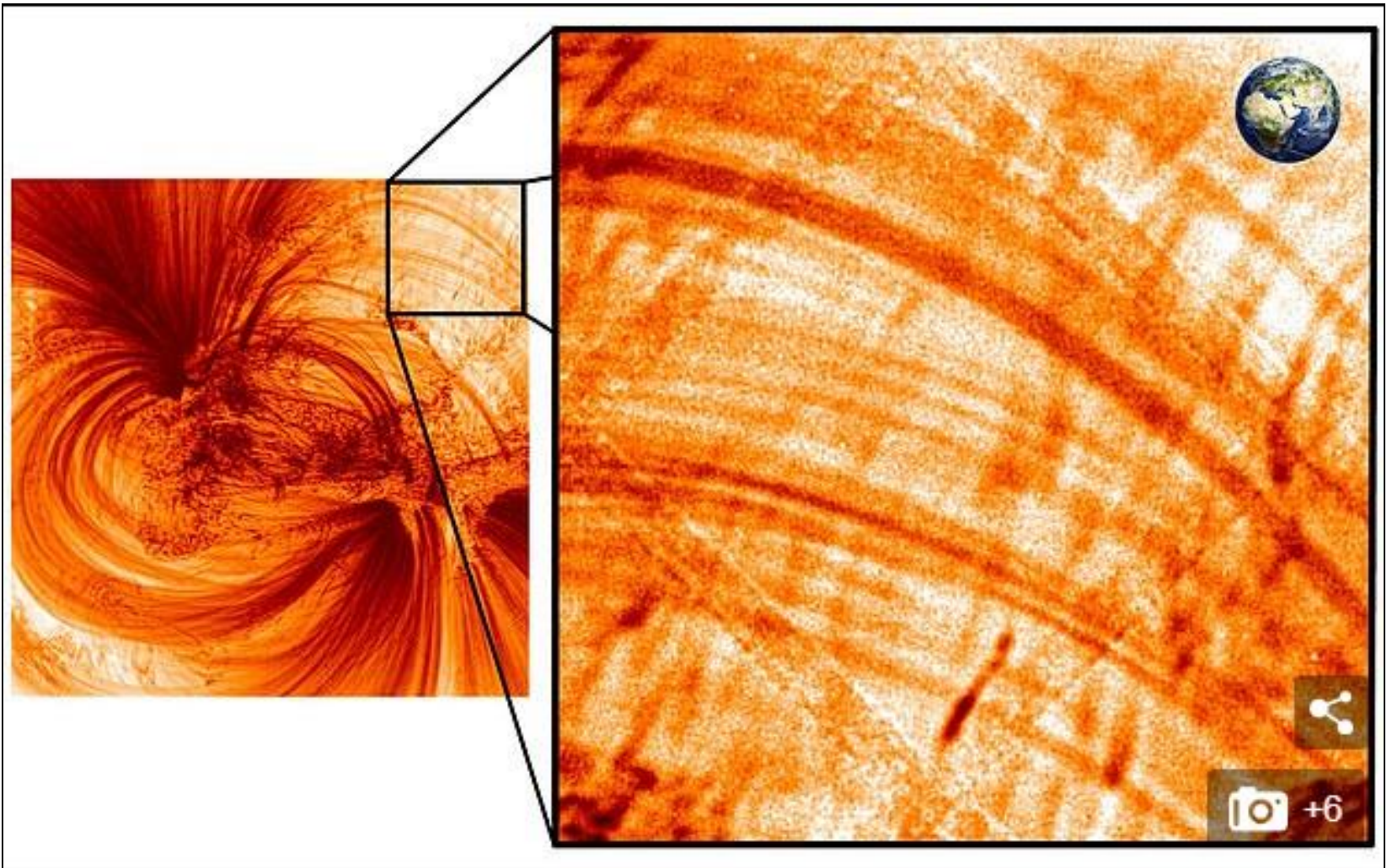


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Each single strand of hot plasma is about 311 miles wide - roughly the distance from London to Belfast with just a small area of strands matching the total size of the Earth



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### WHY DO FEWER SUNSPOTS CAUSE MORE PROBLEMS ON EARTH?

Lack of sunspot activity in the sun is due to a continuing period of inactivity in the star's magnetic field.

As the sun moves through its **11-year cycle**, it experiences active and quiet periods known as the **solar maximum and solar minimum**.

As solar minimum approaches, certain types of activity - such as sunspots and solar flares - will drop, but it's also expected to increase long-lived phenomena.

This includes coronal holes, where fast moving solar winds are created when the star's magnetic field opens up into space. This happens more regularly as the sun's magnetic field becomes less active.

Charged particles make their way out into the solar system through these gaps and hit the atmosphere of our planet.

This can lead to a number of complications, including magnetic storms which can result in power grid fluctuations, impact on satellite operations and can affect migratory animals.

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An increase in solar winds can also alter the chemistry of Earth's upper atmosphere, which may trigger more lightning and aid in cloud formation.

It can also affect air travel, as more radiation is able to penetrate planes. This means passengers on long-haul flights may receive doses of radiation similar to dental X-rays during a single trip, and puts flight crews in additional danger.

The effects of solar minimum may also include Earth's upper atmosphere cooling and shrinking slightly, thanks to less heat reaching the planet. This can allow space junk to accumulate in low Earth orbit.

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Strong solar winds emanating from three massive 'holes' on the surface of the sun have begun to bombard Earth, scientists say. Fast moving solar winds are created where the star's magnetic field opens up into space, pictured here as vast black regions.

